APRIL 15, 1961

Chemical Week

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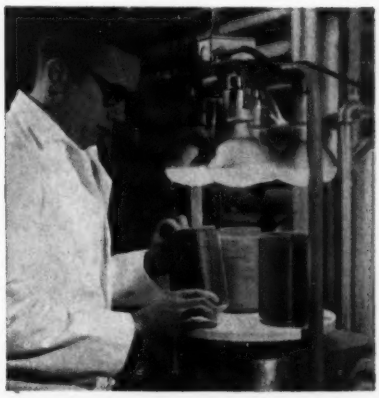

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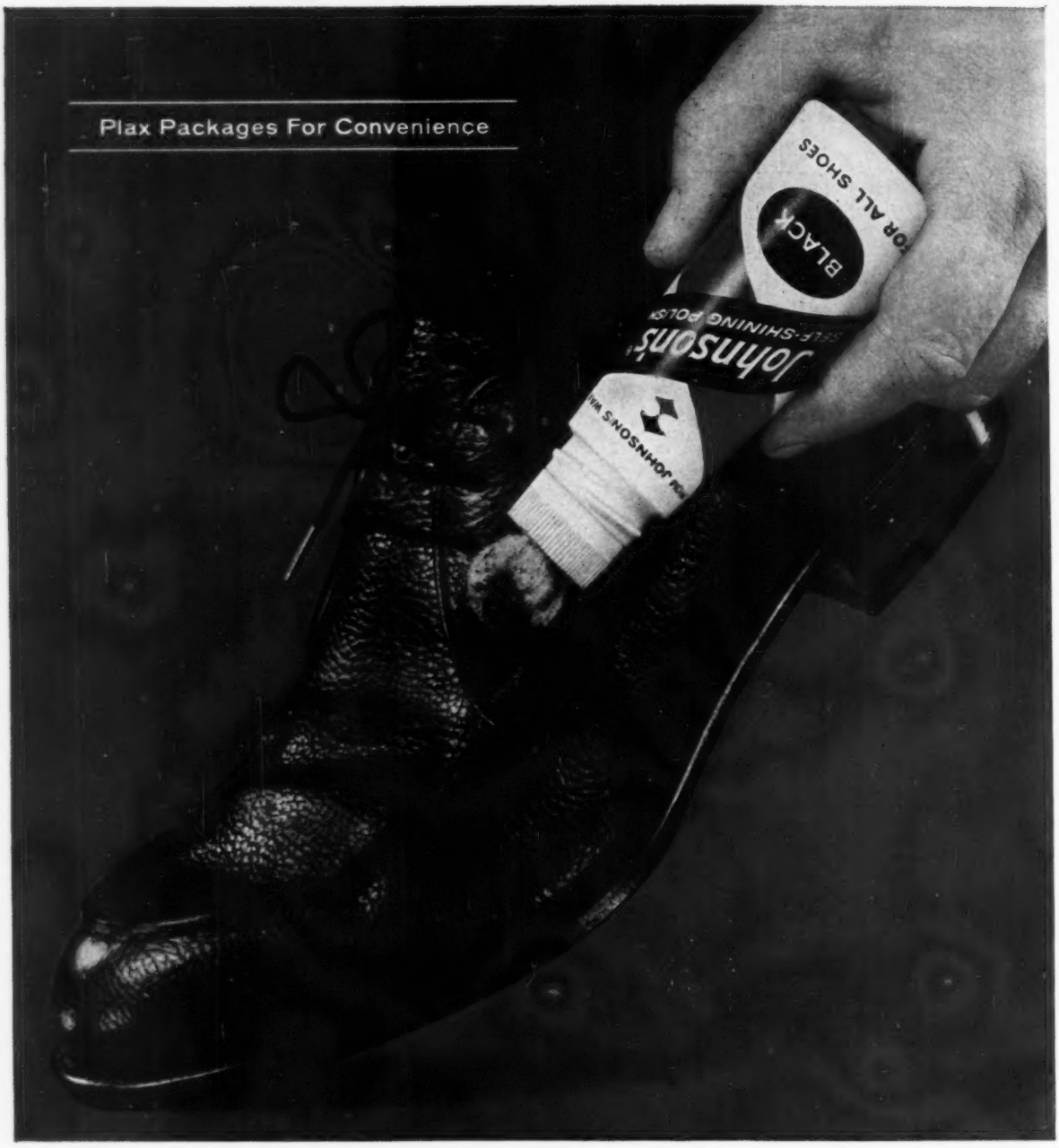

SQUEEZE BOTTLE POLISH BRIGHTENS SALES, TOO

Plastic packaging now adds sales appeal to once-plain shoe polish. The easy-to-use applicator bottle shown here is an industry innovation. It is also an example of Plax engineering and production skills working in cooperation with Johnson's Wax designers. Plastic containers are safe, unbreakable, lightweight and corrosion-resistant. And Plax—pioneer in plastics—offers 26 years of experience to solve your packaging problems.

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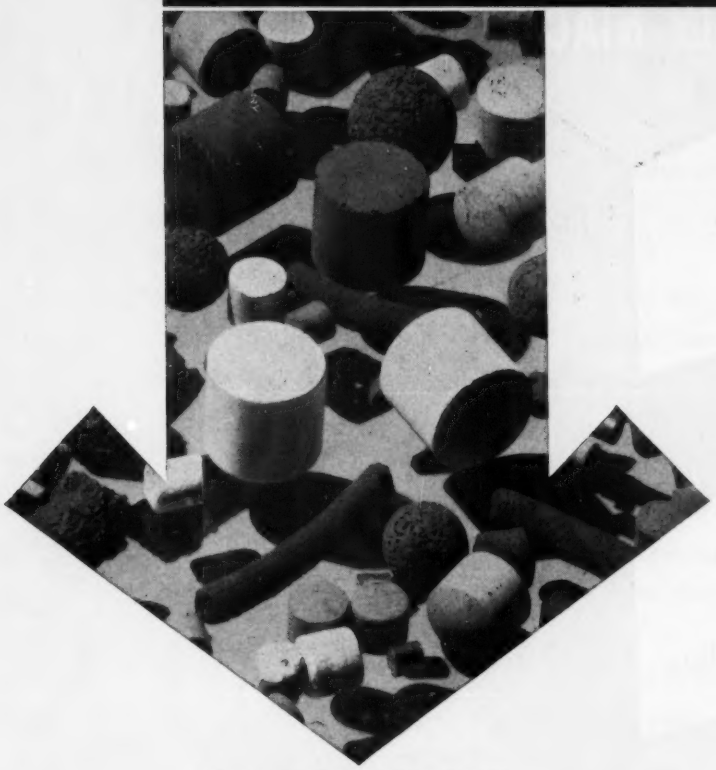

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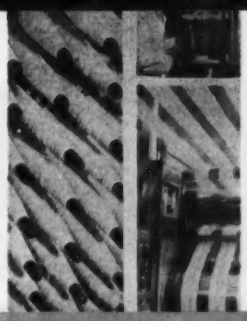

ON THE COVER: In these three photographs taken by Chemstrand, samples of synthetic fibers are shown in various phases of manufacture and test (see p. 69).

Chemical Week

Vol. 88, No. 15 APRIL 15, 1961

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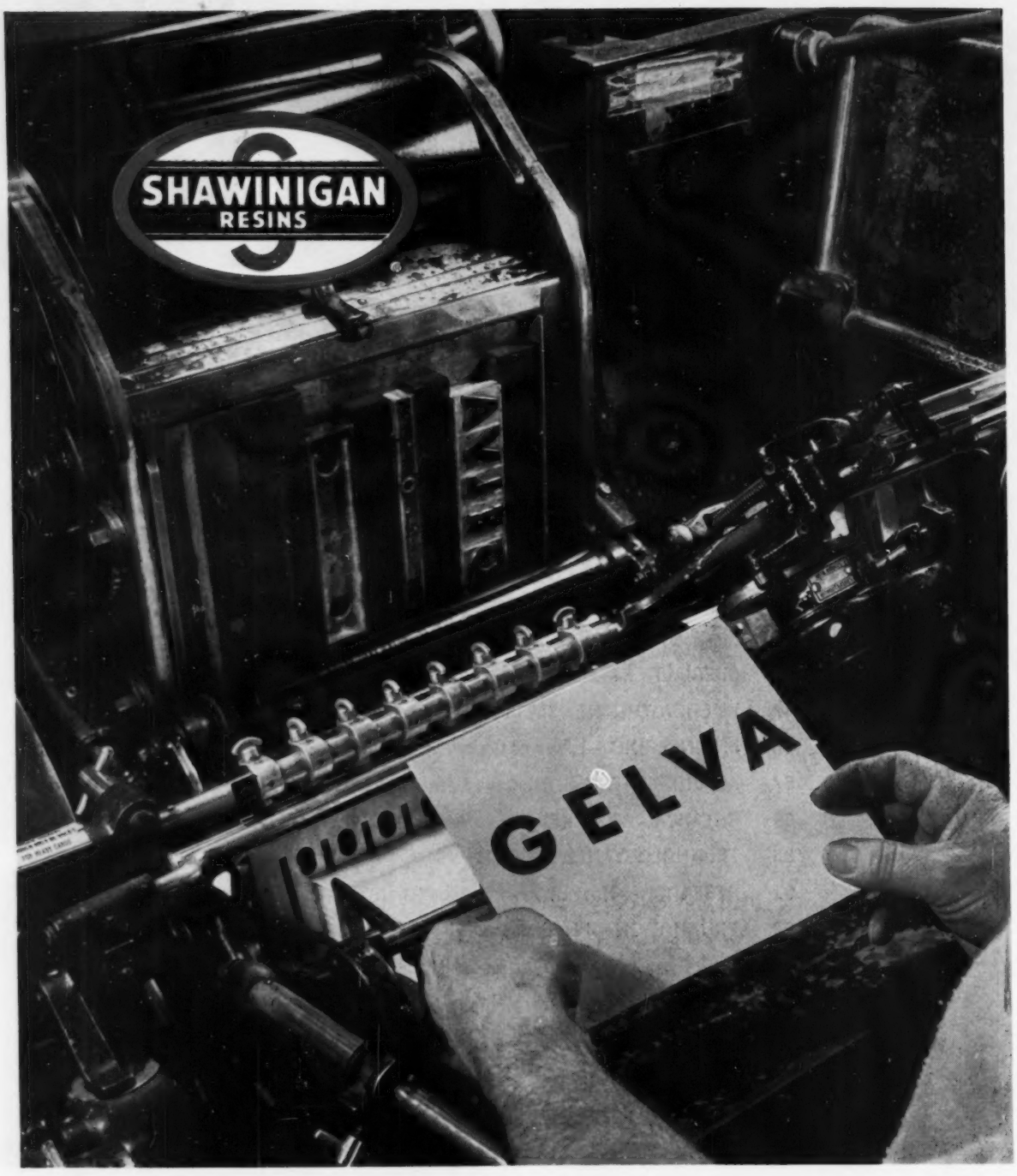

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Protection From One's Friends

THE CHEMICAL INDUSTRY can deal with its enemies, but it seems to need protection from its friends. In this case the friends are customers (in the textile industry) and fellow suppliers (in the petroleum industry).

In the *CW Report* on synthetic fibers (*p. 69*) Author Hindle points out that fiber producers "have learned that they must virtually enter the textile business; that they must do a first-rate job of educating both the textile operators and the retail consumers about their products. They have found that doing these things can sap profits staggeringly. . . . Projected growth probably cannot be achieved unless producers fully accept a profit premise closer to norms of the textile industry.

". . . Many textile manufacturers believe that synthetic fibers are still overpriced . . . Some chemical makers resentfully blame an envious textile industry for trying to condition them to the low rate of return that textile people must tolerate.

"Chemical makers now know that textile industry management is convinced that fiber makers can drop prices. True, textile people have the wrong reasons for such beliefs—they associate the undoubted profitability of nylon production with that of other fibers, and conclude that there's a margin for trimming profits in all cases.

"It is probably hopeless for chemical producers to try to convince textile makers that nylon was an exceptional case; moreover, chemical producers realize that no particular gratitude is felt by the textile industry toward CPI producers who established uses of synthetic fibers (although the job was almost forced upon them)."

In those few paragraphs Hindle sums up the price problem in the fibers field. He also mentions promotion as a point of contention. Fiber producers spend money to promote their particular fibers; textile men would rather have that money (in the form of price reductions) to promote their own fabrics.

The chemical industry has had to do the basic research, the processing research, the applications research, and the promotion—but the textile industry doesn't want to pay for these activities.

Somewhat parallel problems strain the relations of established petrochemical producers and some petroleum companies entering petrochemical production.

The established producers—whether independent firms, oil company divisions or subsidiaries, or joint enterprises—have learned the important differences between traditional refining operations and petrochemical production: chemical plants require several times more capital investment per dollar value of output than do refineries; research expenditures are probably three times as great per dollar of sales; plant obsolescence is much faster; and demand is in terms of pounds rather than barrels.

These factors—and many others—lead to different philosophies of building, producing, pricing and marketing. A neophyte producer who bases his petrochemical operations on a refinery philosophy may learn too late that he is selling a large volume but losing a little on every pound. Why? His depreciation set-asides are insufficient to replace a plant that becomes obsolete much sooner than he expected. His plant can produce a million tons/year economically, but his unit costs are high for the production he can actually sell. His research is too scanty to keep pace with his competitors' new products and improvements.

Careful Market studies, realistic capital and research outlays, and a sound pricing policy are essential forerunners of a successful petrochemical venture.

ONE OF A SERIES OF CHATS ABOUT CONSERVATION AND CONTROL OF HEAT

SARCO TOPICS

A FAMOUS FLUID WITH TEMPERATURE CONTROL PROBLEMS

Wine has never been properly appreciated by enough people. Many think you simply press grapes, bottle the juice, and wait a while to create wine. Even those who pride themselves on their knowledge of this age-old drink are seldom aware of the artful thermal engineering required. Pasteurizing wine is actually one of the most tricky and delicate feats in the field of liquid processing.

Take temperatures. Wine must be pasteurized at 140°F. Those are the facts of life in the world of wine. They might not seem too difficult to live with unless you're in the wine or chemical processing business.

Take New York's Monarch Wine Company, producers of Manischewitz Wine. Their Problem: how to maintain the 140° temperature in the heat exchangers despite wide variations in the rate of wine flow. These variations, between 5 to 60 gallons per minute, result from slowdowns and recoveries in the bottling process. Problem: entire system must be capable of complete shutdown when necessary. Problem: wine temperatures must be raised to 140° as rapidly as possible, sometimes an immediate jump of 100°

Attracted perhaps by aspects of the situation that had little to do with pure science, Sarco engineers applied the collective experience of Sarco technology to the solution of this serious problem. The result for Monarch: the *degree of control* the process demanded—achieved through the excellent use of Sarco Temperature-Pressure Regulators, Float Thermostatic Steam Traps, Thermo-Dynamic Steam Traps, and Pipeline Strainers.

Sarco engineers, ever resourceful, divided each of the two large Cherry-Burrell plate-type heat exchanger units into two separate sections with a blank baffle plate, each with a separate Sarco control. Thermal sensing bulbs were installed in wine discharge and throttling controls hooked into steam supply. As demand fluctuates, one or both regulators function to maintain the 140° temperature.

In higher demand, both regulators are operative; as demand drops and flow decreases, only one regulator supplies steam. Pasteur himself would have been elated.

Each of six smaller capacity shell-and-tube heat exchangers required only one regulator, with the sensing bulb inserted into the outlet side of the wine filled shell, and the regulator throttling steam supply to the tube section. Thus, by controlling flow of steam to the exchangers on the basis of pressure and temperature, the Sarco regulators were able to maintain the temperature of the wine at precisely 140° regardless of fluctuations in demand or supply rate. Whew! A lot of engineering went into those two sentences.

From here on it's downhill. To secure complete cut off of the steam supply during scheduled shut-downs of the bottling run, solenoid valves were provided to supplement normal modulating action of the controls. To discharge widely varying loads of condensate continuously and remove immediately all air and incondensible gases, Sarco Float Thermostatic Steam Traps were installed on all condensate outlets. On the drips before each control valve a Sarco Thermo-Dynamic Steam Trap was installed to insure delivery of dry steam. Sarco Pipeline Strainers were installed before all steam traps and valves to protect them against damage by any foreign bodies. And thus ends a classic story of the grape.

Still, this story has been condensed far too much, really, and we feel you've been cheated out of the story's more delicious details. You needn't be, however. We've printed the facts in detail for posterity and you in Sarco Case History 185, complete with drawings that practically make it a do-it-yourself kit. If you would like a copy, we will be flattered to receive your request, and dispatch it with dispatch.

WE'RE ALWAYS IN . . . AND THE WELCOME MAT'S OUT

We always take it for granted that if you are going to be in the vicinity of our plant you'll phone or drop us a line so we can invite you to visit us. You'll find that our factory in Bethlehem, Pennsylvania, is on many well-travelled routes and that our steam laboratory has much to offer in interest and helpfulness. Forgive us for being immodest, but the lab is the most up-to-date of its kind in the country.

When you visit us, don't allow yourself to get sidetracked by the drill presses and automatic lathes. We're proud of this equipment but you've probably seen metal mutilated before, and it's our steam laboratory that's unique. We promise you a good show, and if you have any problems, bring them along. We'll solve them while you wait.

ANYONE FOR KEY CHAINS?

We seem to have these key chains. Want one? They're much more convenient than a case. A tiny replica of a Sarco Thermo-Dynamic Steam Trap, Type TD-50 is attached, but you can always remove it if you find it too commercial. There must be many things you could use these chains for. Fishing sinkers? Lengthening a light cord, maybe? Anyway, if your Sarco representative is out, write in.

Pardon our monopolizing the conversation in this series of paid communiques, but we're trying our best to interest you in certain subjects that concern us both—to the point where you'll communicate.

6354

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Originally NEOTEX Blacks were designed to provide SBR passenger tires with soft ride and low noise, and as a channel black replacement. Also, for natural rubber off-the-road truck tires with superior chipping and cutting resistance. In the course of performance evaluation, it was found that NEOTEX Blacks gave excellent traction.

To determine traction characteristics exactly, tests in the U. S. and Canada have just been completed . . . following, as closely as possible, National Safety Council Test procedures.

Ice traction and skid tests were made on Lake Bernard in the North Bay, Ontario area. Packed snow tests were made on roads in the immediate vicinity. A medium-sized 1961 passenger car, checked for alignment, balance, brakes, and equipped with a 40 mph governor, was used.

Evaluated were SBR rib passenger tires containing as the control, STATEX 125 (ISAF), and as the experimental, tires containing NEOTEX 130. Also evaluated were SBR snow tires having as a control, STATEX R (HAF), and as the experimental, NEOTEX 100.

Two types of tests were made:

(1) Traction test consisted of starting car with immediate full acceleration as controlled by the governor from a complete stop, and measuring the stop-watch time to reach a point 20 yards and 120 yards down the course, noting the speed in miles per hour at the 120 yard point.

(2) Skid test was conducted by starting car into the test course at a set speed of 20 miles per hour. At a designated point, hand brake was locked, setting the rear wheels, and skid distance accurately measured in feet.

Results: On clear ice, the NEOTEX 130 rib tire and the NEOTEX 100 snow tires provided 20 per cent better traction than their respective ISAF and HAF controls. Clear ice skid tests were severe for all tires but directional improvements in the range of 6 to 8 per cent for the NEOTEX were noted.

On hard packed snow on an ice base, the NEOTEX 130 tires gave 20 to 25 per cent better traction than the ISAF control and 16 per cent better skid resistance. This 16 per cent improvement at 20 miles per hour amounted to approximately 20 feet.

Hill traction tests conducted on packed snow with an ice base showed the NEOTEX 130 rib tire and the NEOTEX 100 snow tire had excellent times to the 20 and 120 yard markers, with surprising traction on the 8 degree slopes. ISAF rib and HAF snow tire controls were unable to gain traction.

In further hill tests on 15 degree slopes, the NEOTEX 130 rib tire and NEOTEX 100 snow tires climbed with a slow running start and were also able to come to a full stop on the slopes and start again without breaking traction. ISAF rib tire and the HAF snow tire controls were unable to climb the hill, breaking traction even with a slow running start.

Further extensive skid and traction tests are now in progress. For full details, write or wire . . .

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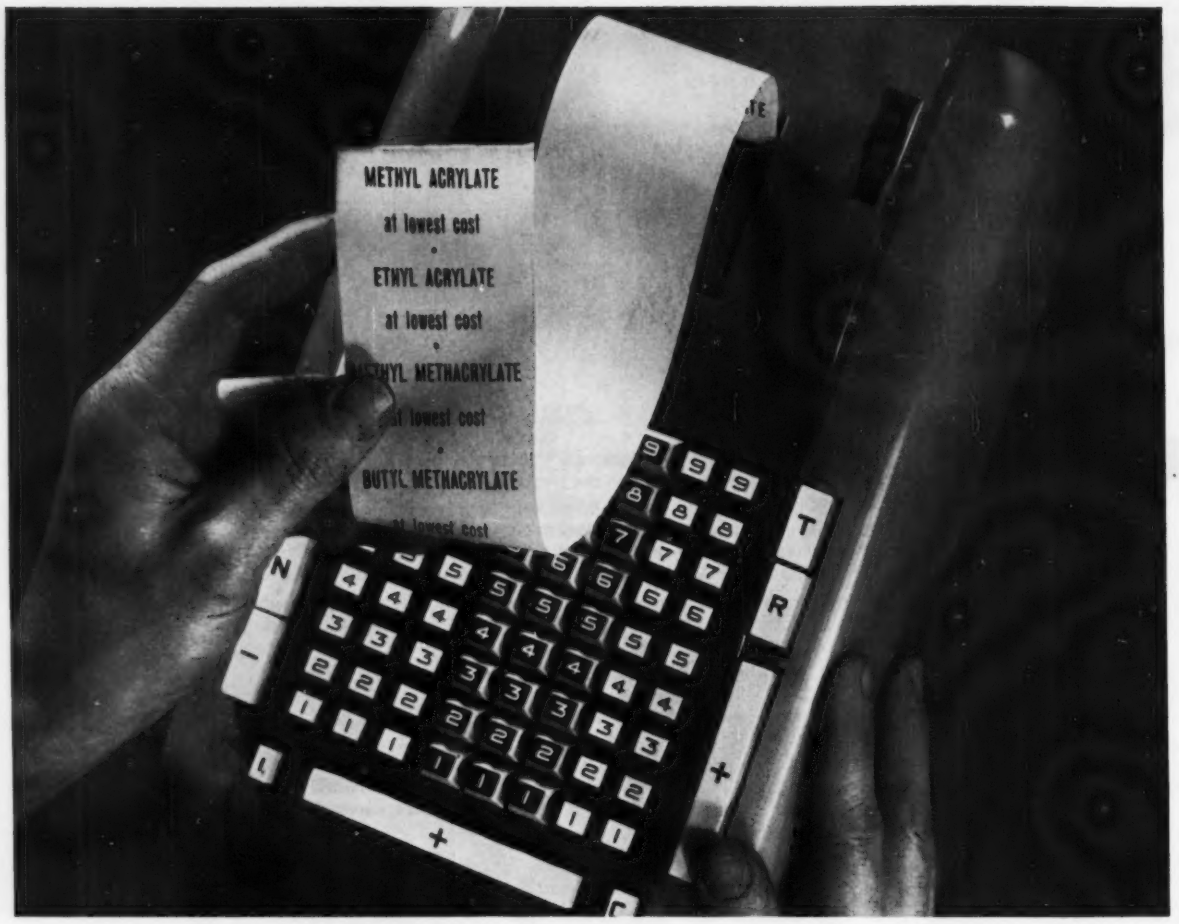

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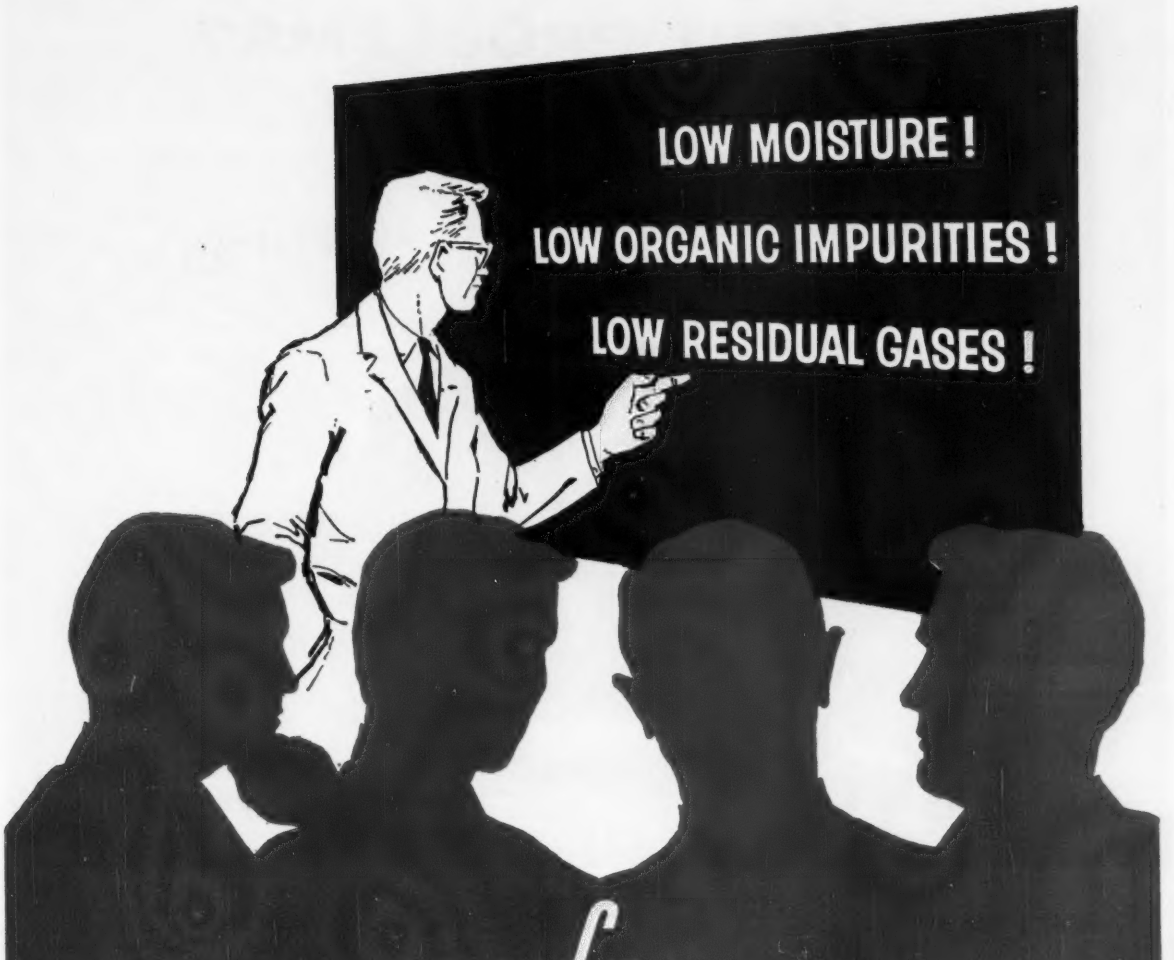

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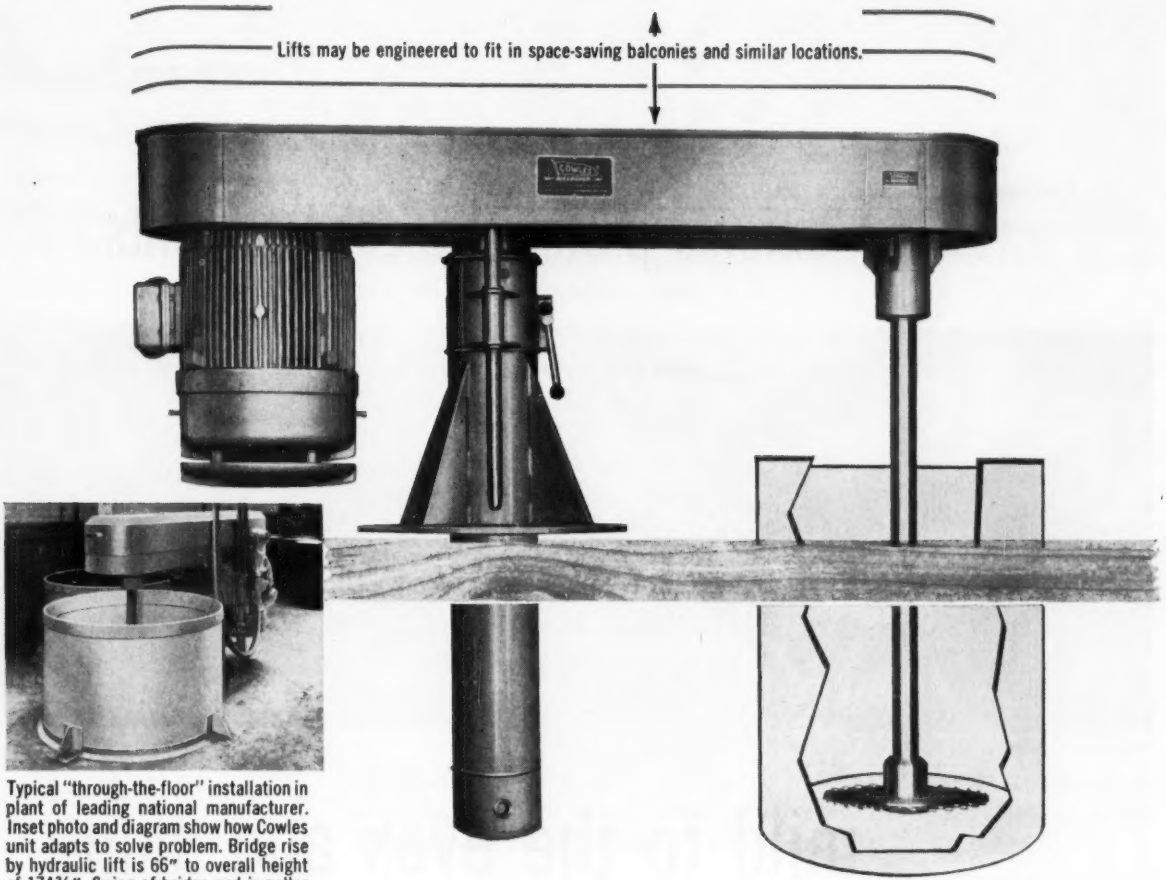

Typical "through-the-floor" installation in plant of leading national manufacturer. Inset photo and diagram show how Cowles unit adapts to solve problem. Bridge rise by hydraulic lift is 66" to overall height of 174¾". Swing of bridge and impeller is 270°. One or multiple mixing tanks may be used — as batch or continuously. Available in 40 to 75 H.P. sizes with lifts engineered to meet plant requirements.

NEW COWLES *through-the-floor* DESIGN SOLVES MANY MIXING PROBLEMS

...in some cases may be the only solution!

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Where space can be made available on upper floors, balconies, walk-ways, etc., it may be the answer—*may even eliminate the need for major plant expansion!* It is applicable to fixed tanks as well as mobile —under certain conditions—for either continuous or batch operations.

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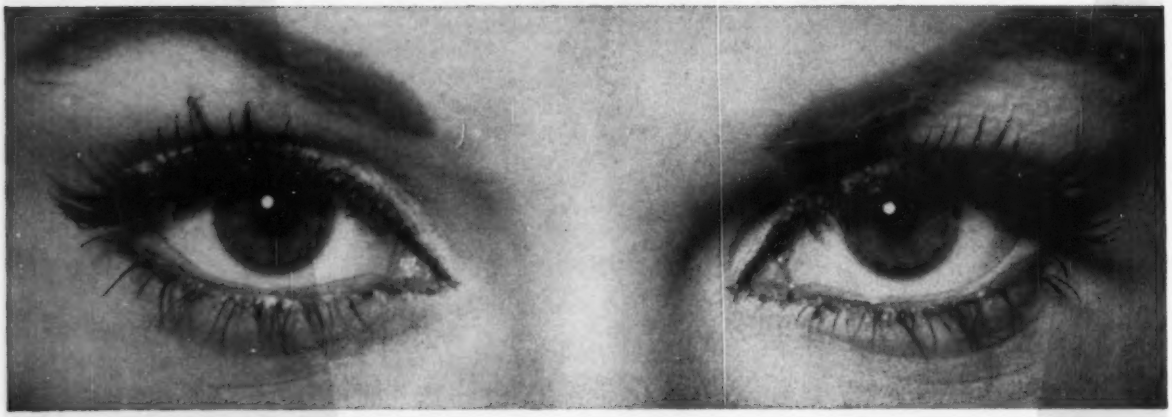

mild to the eyes and skin

Intriguing eyes, aren't they? Certainly be a shame to irritate them with any harsh surfactant. Stepan's Maypons (anionic protein-based detergents) are intriguing too. They are outstanding as detergents, foaming agents and emulsifiers and meet the Draize-Woodward Eye Irritation Test at all concentrations. Perfect for shampoos, cold waves, bath preparations, creams, lotions, etc. . . . any product used on or near eyes and skin.

Outside the cosmetic field the Maypons show excellent protective action on hair and wool. In alkaline liquid cleaners they offer unusual solubility in concentrated solutions. And being slow wetters they are ideal for rug shampoos.

STEPAN CHEMICAL COMPANY

Edens & Winnetka, Northfield, Illinois
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Business
Newsletter

CHEMICAL WEEK
April 15, 1961

More help for small chemical companies in depressed areas. Direct federal loans are now available at 4% interest. Action by the Small Business Administration last week, which cut the rate from 5½%, applies to some 285 labor-surplus areas.

Apparently Administrator John Horne expects a flood of loan requests. He has about $99 million in lendable funds, but will ask Congress for an additional $100 million to add to the loan pool.

Additional help for all industry will be proposed by President Kennedy when his long-awaited tax message goes to Congress this week. It will include Administration plans to spur investment in new plant and equipment. Whatever device the President pushes to stimulate new capital investment, it should spark hot debate on the number of tax-easing proposals already in the Congressional hopper. Many of these advocate further liberalization of depreciation allowances (*CW, March 25, p. 111*).

•

Confidence in polyolefins outlook. While Hercules and Louisiana government officials were making the traditional dedication speeches at a newly completed Lake Charles polyolefins plant at midweek, work was being pushed on the second 60-million-lbs./year unit nearby.

When all current construction is completed in '62, Hercules will have capacity to turn out some 200 million lbs./year of high-density polyethylene and crystalline polypropylene. The new plant, described as "ultramodern," is completely automated, will be fed propylene raw material from an adjacent Petroleum Chemicals installation.

•

General Electric is in the news again. Word is that it will spend some $750,000 expanding its Pittsfield, Mass., phenolic molding compound plant. Installation of new equipment will begin late this year, will be ready for operation in '62. The company is quiet about ultimate size of the unit, but the latest investment will increase capacity some 30%.

•

When is 2 tons of a chemical a lot? When it's enriched uranium carbide. Spencer Chemical reports that it has received an order for approximately 4,000 lbs. of 3.7% enriched material, "the largest single order ever placed," from the Atomics International Division of North American Aviation.

The carbide, in a new crystalline form, reportedly is destined for use as prototype fuel elements for the sodium graphite reactor being designed by AI at Hallam, Neb. If the prototypes work out, chances are all future cores for the reactor will be uranium carbide. An economic bonus: the crystalline form can be produced at approximately half the cost of older ceramic forms. Selling price of the new, easier-to-use crystalline

product ranges from $20 to $500/lb., depending on enrichment, quality and quantity specified.

•

Expansions in Texas. At Big Spring, W. R. Grace acknowledges officially this week that it will build a new, 60,000-tons/year ammonia plant to supply fertilizer to west Texas markets (*CW Business Newsletter, March 18*). The new ammonia unit (Grace's fifth) is slated to be producing early next year, will be designed and constructed by Foster Wheeler (New York), and operated by Grace affiliate Cosden Petroleum.

Texas Eastman is quietly expanding its petrochemical interests at its Longview, Tex., complex. Work is nearing completion on a heretofore undisclosed "new chemical manufacturing unit." No details are available yet, but the company admits that part of the construction going on at Longview will be for production of chemicals from isobutyraldehyde.

•

New developments abroad in petrochemicals and fertilizers:

Engineering studies are under way for a $17-million petrochemical plant (completion expected in mid-'63), near Rotterdam. The complex will be built by Esso Nederlands, an affiliate of Standard Oil (New Jersey).

Chemicals to be turned out in the projected 220,000-metric tons/year plant—said to be one of the largest of its kind ever to be constructed—including benzene, toluene, xylenes and xylene-related products, all destined for use in such fields as plastics, synthetic fibers, detergents, resins and insecticides.

Next year Britain's chemical industry takes another step toward vertical integration. Imperial Chemical Industries Ltd. plans a plant capable of distilling about 1 million long tons/year of crude oil to supply naphtha principally to its three olefin plants at Wilton. Naphtha requirements currently run about 600,000 l.t./year, but raw material needs will be upped significantly when Wilton soon begins producing some 140,000 l.t./year of ethylene that will go chiefly into polyethylene and polyester fiber (Terylene).

A new high-analysis fertilizer plant will begin producing at Zanvoorde, near Ostend, Belgium, in the summer of '62. Just-formed Fison U.C.B., S.A. (by Fisons Fertilizers Ltd. and Union Chimique Belge of Brussels), will use a new production process now under development. Output (initially 29 l.t./hour) will serve fertilizer markets in Belgium and neighboring Common Market countries, as well as overseas territories.

•

Off—about 4% from a year ago. That sums up a last minute report on first-quarter sales for both Du Pont and Hooker Chemical. For Du Pont: sales were $512 million; no figure yet on earnings, but these were lower too. Hooker: sales, $34.7 million; earnings off 12½% to $2.6 million.

Get Sodium Bicarbonate in the grain size you need every time...

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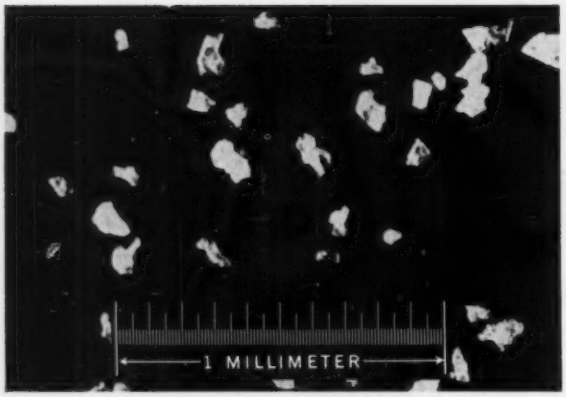
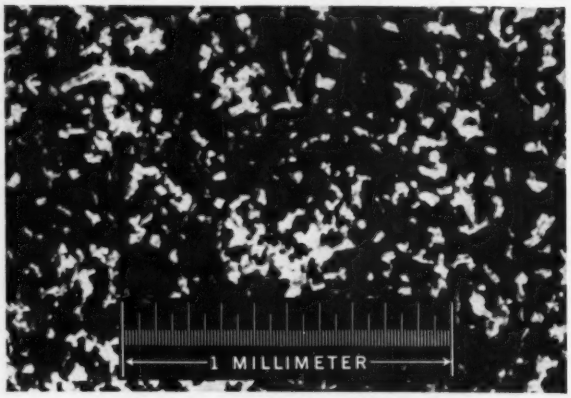


Sodium Bicarbonate U.S.P. Powdered No. 1—For general purpose use in chemical processing, dyestuffs, adhesives, starches, textiles and industrial applications.

TYPICAL SCREEN ANALYSIS
CUMULATIVE PERCENT RETAINED BY

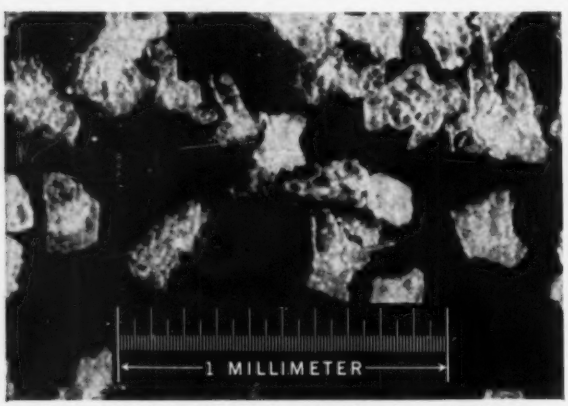
42 Mesh	Trace	200 Mesh	35.0%
100 Mesh	.5%	325 Mesh	70.0%
170 Mesh	20.0%	400 Mesh	80.0%



Sodium Bicarbonate U.S.P. Fine Powdered No. 3DF for use specifically in dry powder fire extinguisher mixes, also in rubber and plastics blowing, lubricant for sheet vinyl.

TYPICAL SCREEN ANALYSIS
CUMULATIVE PERCENT RETAINED BY

170 Mesh	Trace	325 Mesh	25.0%
200 Mesh	2.0%	400 Mesh	45.0%



Sodium Bicarbonate U.S.P. Granular No. 5 for use in effervescent salts, other pharmaceuticals and special types of cleansers.

TYPICAL SCREEN ANALYSIS
CUMULATIVE PERCENT RETAINED BY

42 Mesh	Trace	100 Mesh	92.5%
65 Mesh	27.0%	170 Mesh	99.0%
80 Mesh	66.5%		

Sodium Bicarbonate U.S.P. Treated Free-Flowing for use in fire extinguishers and sponge rubber.

TYPICAL SCREEN ANALYSIS
CUMULATIVE PERCENT RETAINED BY

42 Mesh	Trace	200 Mesh	35.0%
100 Mesh	.5%	325 Mesh	70.0%
170 Mesh	20.0%	400 Mesh	80.0%

Are you getting Sodium Bicarbonate of the specific grain size for optimum results in your process or for maximum shelf life and performance of your products? You can eliminate doubts by specifying Church & Dwight. This simple step will assure you of obtaining the widest selection of grain sizes available because Church & Dwight is the country's largest supplier of Sodium Bicarbonate U.S.P. You'll also receive for the asking unmatched technical service based on more than 100 years of experience with Sodium Bicarbonate. Unusual grain size requirements are given special attention. Try us and see. For technical data on all grades of Sodium Bicarbonate, send for brochure, "Church & Dwight Sodium Bicarbonate—How It Serves Industry Today."

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new concepts in solids processing

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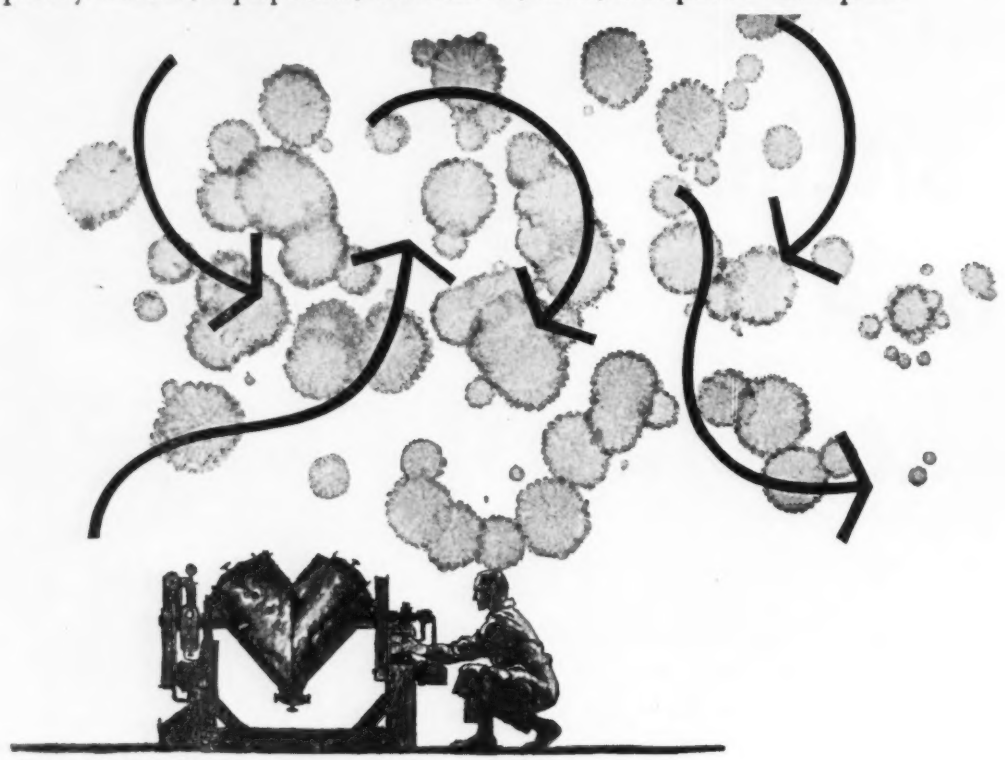

*Patented and Patents Pending

A production model of the new Solids Processor is available for testing at our Pre-Test Laboratory. Standard, intensifier and liquid-solids "Twin Shell" Blenders* are also available . . . as are packaged vacuum tumble dryers (conical type) and ribbon blenders. » » » The P-K Pre-Test Laboratory provides accurate predictions on savings, scale-up and operational procedures. We invite you to take full advantage of its facilities—either by bringing or sending your materials. To make arrangements, write or call George Sweitzer at East Stroudsburg. To call direct dial 717-Hamilton 1-7500. » » » A new P-K Solids-Process Catalog #16-P is now available.

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116 Burson Street, East Stroudsburg, Pa.

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DIDYMIUM CARBONATE
DIDYMIUM FLUORIDE
CERIUM NITRATE
CERIC AMMONIUM NITRATE
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Interested? If so, let an American Potash representative tell you in more detail about these commercially produced, commercially priced, rare earth chemicals.

If your interest in rare earth chemicals is still in the developmental stage, American Potash can supply laboratory quantities of these and other rare earth, thorium and yttrium chemicals in any amount you require at prices on request.

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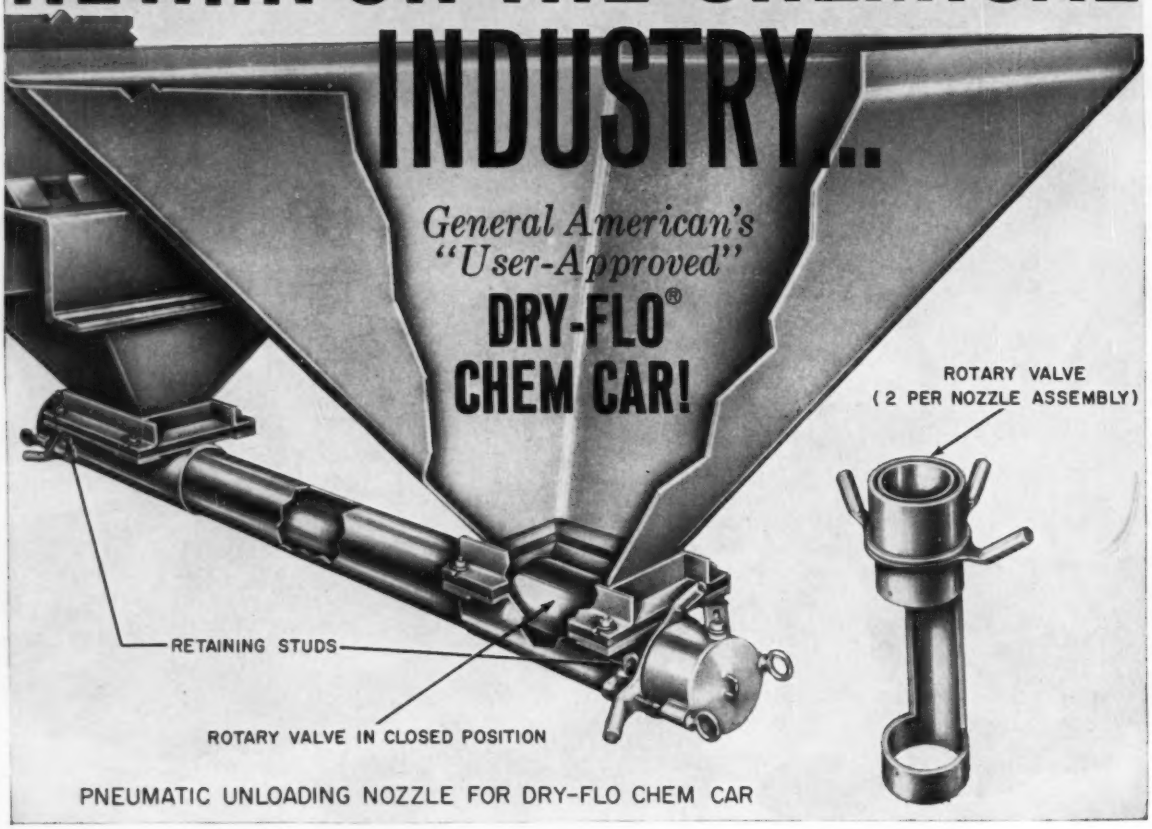
DRY-FLO® CHEM CAR!



PNEUMATIC UNLOADING NOZZLE FOR DRY-FLO CHEM CAR

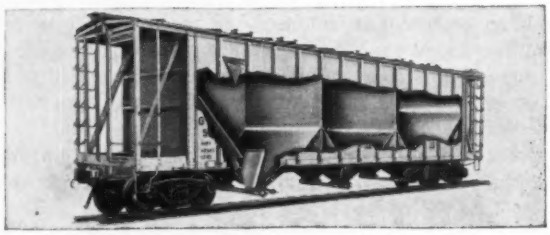
Designed especially for dependable, safe bulk shipment of polyethylene, polystyrene, polypropylene and similar chemicals in dry form.

The new 3,500 cu. ft. capacity Dry-Flo Chem Car was developed for the chemical industry to provide a car which would assure freedom from contamination and moisture pick-up while in transit and during unloading.

The car is welded throughout, has fully-gasketed openings, unloading nozzles (created especially for pneumatic unloading) designed for fast disassembly–speedy and complete cleaning. Also the car is divided into three separate compartments.

Illustrated is a schematic view of the new, exclusive General American unloading nozzle. Unloading flow can be controlled to accommodate individual unloading systems. Three outlets are provided on each car, thus requiring fewer connections and adjustments, minimizing the possibility of contamination.

275 of these cars are already in service or on order. If you would like further information on the Dry-Flo Chem Car, write to . . .



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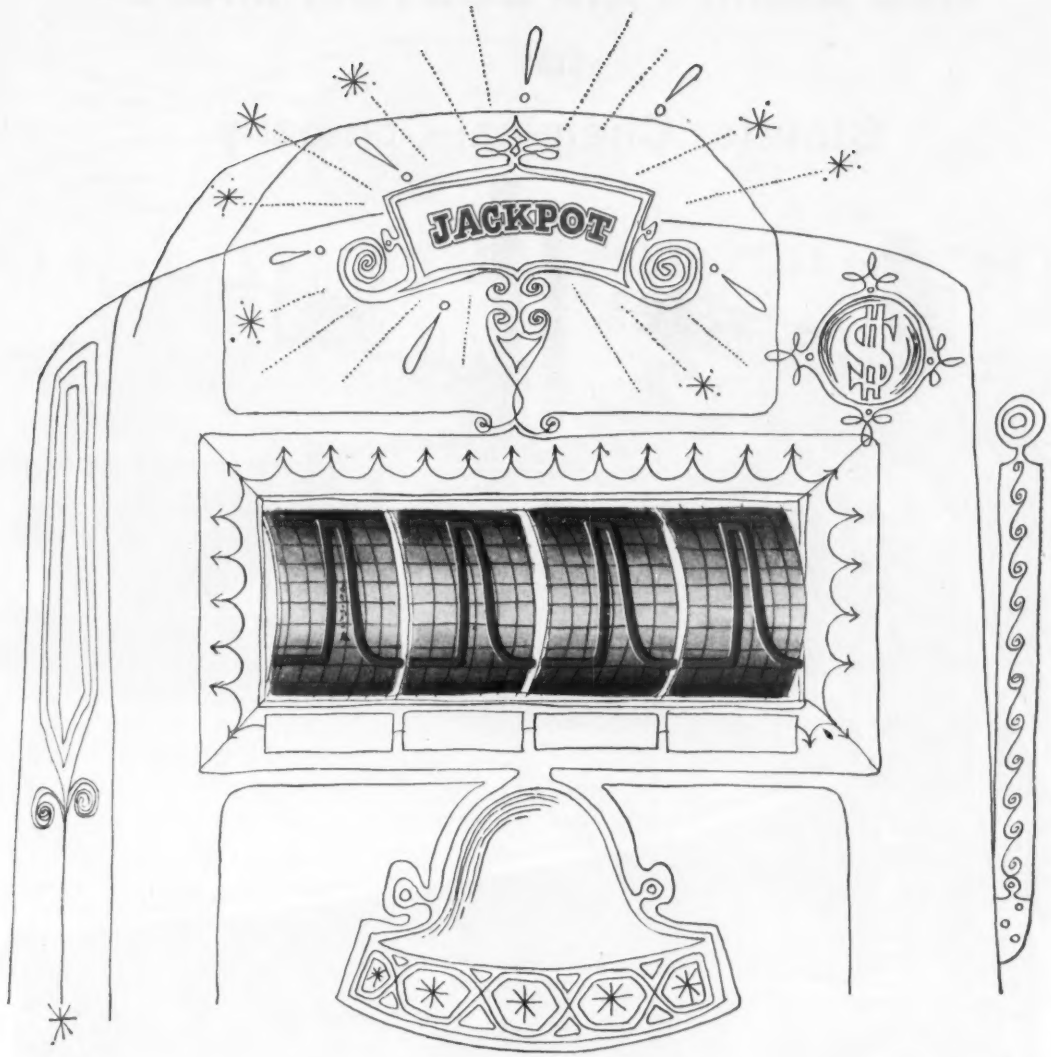

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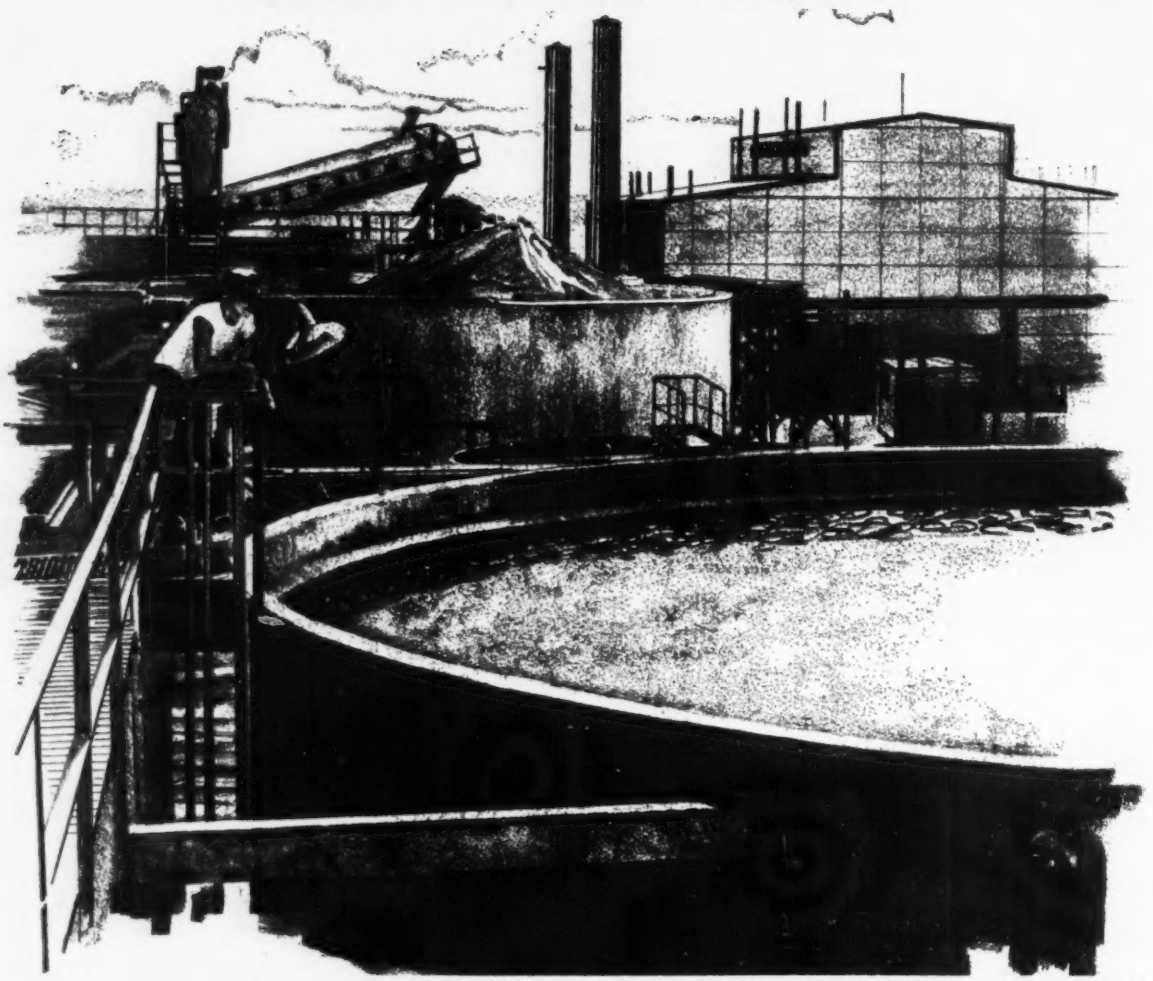

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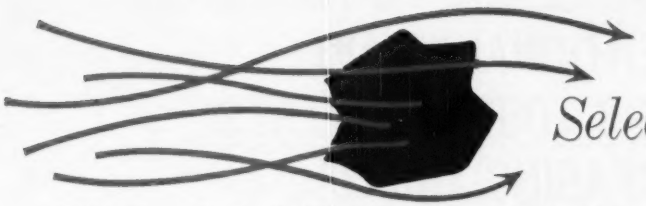

Selective adsorption...

THE CASE FOR DAVISON SILICA GEL

It's probably a familiar fact to you that Silica Gel is not a "gel" at all, but a brittle solid resembling broken glass . . . completely honeycombed with inter-connecting pores of submicron size. This structure provides a tremendous internal surface area which is accessible to molecules diffusing through the pores.

Consider: One cubic inch of Davison Silica Gel has an adsorptive surface of 90,000 square feet—an area larger than two city blocks. The Silica Gel produced for gas dehydration and hydrocarbon recovery is a typical example. It has an internal surface area of over 800 square meters per gram of desiccant and a total pore volume of .43 cc per gram.

This great adsorptive capacity is what makes Davison Silica Gel a favored desiccant for air and gas dehydration. But today, dehydration of itself is only half the story. These days, Silica Gel is getting more immediate attention because of its *selective* adsorption ability.

What is "Selective Adsorption"?

Every material has some ability to adsorb vapors, but such ability is strictly a matter of degree. Silica Gel, on the other hand, is outstanding in its ability to carry out adsorption *selectively*, while holding a larger quantity of adsorbate per unit area than most other materials. Through the development of specific processes, Davison can manufacture a variety of Silica Gels which can preferentially adsorb one substance over another. Through the years, production reliability has improved to the point where the number of grades of Silica Gel provide a choice for almost every need.

Today, Davison produces some 30 different grades of Silica Gel for an increasing variety of uses. To name a few: *natural gas drying; hydrocarbon recovery; chromatography; catalyst support;* recovery of distillate from natural and separator gases; *drying liquid petroleum gas; drying air in wind tunnels;* keeping precision electronic instruments dry; many forms of packaging where air drying is essential to prevent rust; corrosion, mildew; *refrigeration systems; equipment storage, underground gas storage* and *drying of annealing* ovens and blast furnace gases.

Why Should YOU Consider Davison Silica Gel?

If the above isn't enough to whet your appetite for further data, consider Davison Silica Gel's extremely high purity . . . its higher resistance to fouling and contamination . . . its lower regeneration cost . . . its longer operating cycles in dynamic drying systems.

As America's leading supplier of this selective adsorbent, Davison is ready to apply its knowledge and experience toward helping you exploit the valuable properties of Silica Gel for your own product and profit advantages. In addition, we're deservedly proud of our ability to deliver on time, per your order. Write us today, attention Dept. 3504, or call us any time for technical assistance.

GRACE

DAVISON CHEMICAL

There's a lot more to the Davison Silica Gel story. Write us today. Find out how we can help you.

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Please send information and facts about the use of Davison Silica Gel.

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Company.....

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New CLUPAK extensible paper reduces waste – even saves space – in your warehouse! That's because impact and strain which destroy conventional kraft are *absorbed* by multiwalls made from stretchable, flexible CLUPAK extensible paper. They can be stacked higher, shifted faster, and handled rougher than ordinary bags – with little danger of splitting or bursting. This extra toughness enables you to use multiwalls of lower basis weight – another saving!

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Two major filling line problems, breakage and uneven filling, are substantially eliminated by multiwalls made from CLUPAK extensible paper. Remarkably flexible, they fill quickly and uniformly. And because these tougher multiwalls have greater impact strength – the ability to *absorb* shock – they resist rough treatment that tears conventional bags. Breakage is reduced, repackaging minimized, production speeded! Try multiwalls made from CLUPAK extensible paper, soon!

Prior to CLUPAK extensible paper, there were no controlled standards of toughness in the paper industry. Clupak, Inc., is proud to have established these standards and permits the use of its trademark only on paper which meets these rigid toughness requirements.

EXTENSIBLE CLUPAK® PAPER

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GREATER STRENGTH WITH LOWER TOTAL BASIS WEIGHT

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This phone conversation actually took place when the chief engineer of one division of a large chemical company called his opposite number in another division to check the Birds performance record before placing an order.

The "forgotten" Birds are running 24 hours a day, 7 days a week. Each handles 500 gpm of a heavy slurry containing somewhat abrasive solids. An average of 250,000 tons of solids are dewatered before the conveyor facing is renewed. Between times, routine lubrication was all they needed. No wonder the "chief" had dismissed them from his mind.

This is but one of hundreds of examples of Bird Centrifugal stamina and service. It's a good one to keep in *your* mind *before* you buy solid-liquid separating equipment. *After* you buy Bird, it's *off* your mind.

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Progress Report... —2-Methylpentaldehyde —Non-toxic Pigments

Now: isomerically-pure, six-carbon aldehyde

CARBIDE is now offering commercial quantities of 2-methylpentaldehyde. This colorless liquid is almost insoluble in water, though miscible with ethanol and other organic solvents.

2-Methylpentaldehyde boils at 118.3°C. at atmospheric pressure. It sets to a glass below —100°C. Its solubility in water is 0.42% by weight. Molecular weight is 100.16.

2-Methylpentaldehyde is easily oxidized to 2-methylpentanoic acid or reduced to the corresponding alcohol. It undergoes typical aldol reactions with aldehydes to form higher molecular weight condensation products. In reaction with formaldehyde, followed by hydrogenation of the reaction product, 2-methyl-2-propyl-1, 3-propanediol is obtained. This diol is an intermediate in the preparation of meprobamate tranquilizers.

Since 2-methylpentaldehyde contains a reactive carbonyl group, it is easily converted to the cyanohydrin, hydroxy acid, acetal, or to other organic compounds that may be of value in the synthesis of pharmaceuticals, plasticizers, rubber chemicals, dyes, resins, and insecticides.

2-Methylpentaldehyde is supplied by CARBIDE in tank car or tank truck quantities, in compartment tank cars or trucks with other CARBIDE chemicals, or in 55-gal. drums (LCL or carload lots). Samples are also available. For detailed information, call the Technical Representative in your nearest CARBIDE office.

A Technical Information Bulletin on 2-methylpentaldehyde can be obtained by checking the coupon.

Good source of yellow pigments

It is impossible to keep colorful playthings out of the mouths of babies and toddlers. Consequently, for their health protection, toys and nursery equipment must be painted in colors that are *non-toxic*.

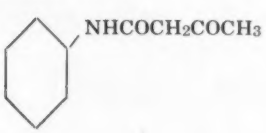
Among the pigments popular for coating toys are the "Hansa" yellows. These pigments, being less toxic than chrome or cadmium colors, are favored for enamels used to coat cribs and other nursery furniture.

In the same organic family are the benzidine yellows, often utilized in printing inks and textile-printing colors. In such applications, ease of dispersion is an advantage. Both "Hansa" and benzidine pigments are useful in tinting rubber and plastic materials, as well as for dope coloring of synthetic fibers. Because of their alkali resistance, the "Hansa" pigments are also frequently used in latex paints.

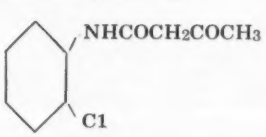
To produce "Hansa" and benzidine pigments, CARBIDE's acetoacetarylamides with diazo or tetrazo compounds are widely used. The resulting colors have high tinctorial strength and are not darkened by atmospheric sulfur.

The acetoacetarylamides available from CARBIDE are as follows:

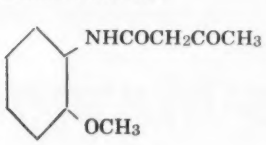
Acetoacetanilide



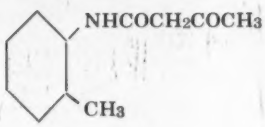
Acetoacet-ortho-chloranilide



Acetoacet-ortho-anisidide



Acetoacet-ortho-toluidide



CARBIDE's acetoacetarylamides are flaky-white, crystalline solids, resembling ethyl acetoacetate in reactivity. Reactions of the acetoacetarylamides with chlorines, amines, and other chemicals are contained in a technical bulletin now available. Also included are physical properties, specifications, and shipping data. For a copy, please use the coupon.

Tear out this coupon. Check the boxes on which you'd like more information, and mail to Dept. H, Union Carbide Chemicals Company, 270 Park Avenue, New York 17, N. Y.

☐ 2-Methylpentaldehyde
☐ Acetoacetarylamides
☐ Physical Properties of Synthetic Organic Chemicals—a comprehensive description of the properties and applications of nearly 400 CARBIDE chemicals.

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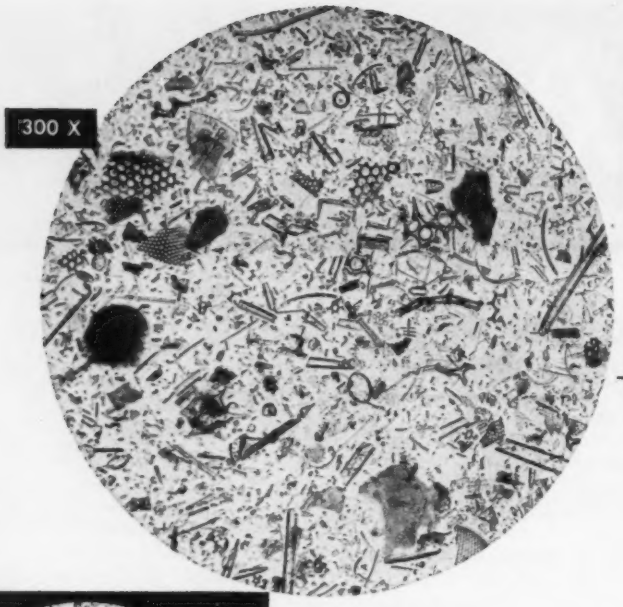
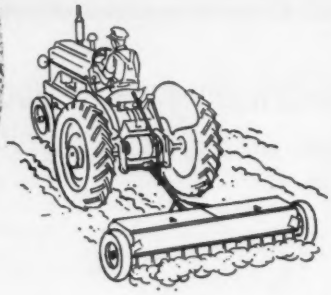
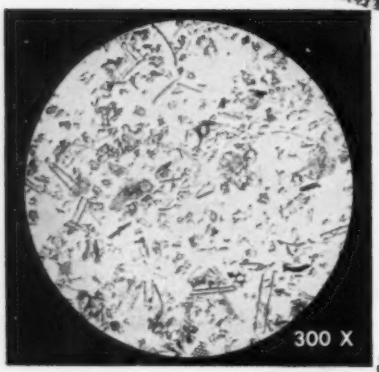
UNION CARBIDE CHEMICALS COMPANY

UNION CARBIDE



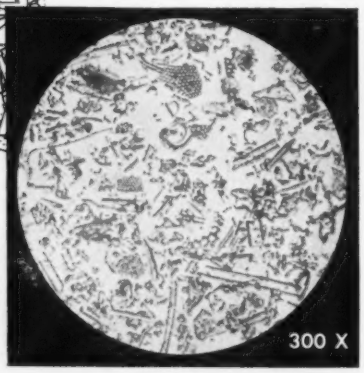
For fertilizer coating—Celite 379, a natural milled diatomite, provides the uniform conditioning needed to prevent caking of granular, mixed or prilled fertilizers—maintains good free-flow characteristics even after prolonged storage.

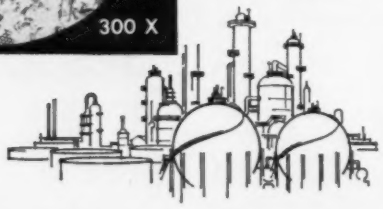




For catalyst carriers—Super Floss, finest particle size flux-calcined Celite grade, is used where a non-reactive porous silica support is needed. (Also available: special Celite supports in many preformed shapes for strength, high temperature stability, resistance to abrasion and attrition.)

As a paint-flatting agent—Celite 281, air-floated fines of flux-calcined diatomite, provides uniform and efficient flatting at low cost. Contributes to control of low angular sheen, durability, and faster drying.





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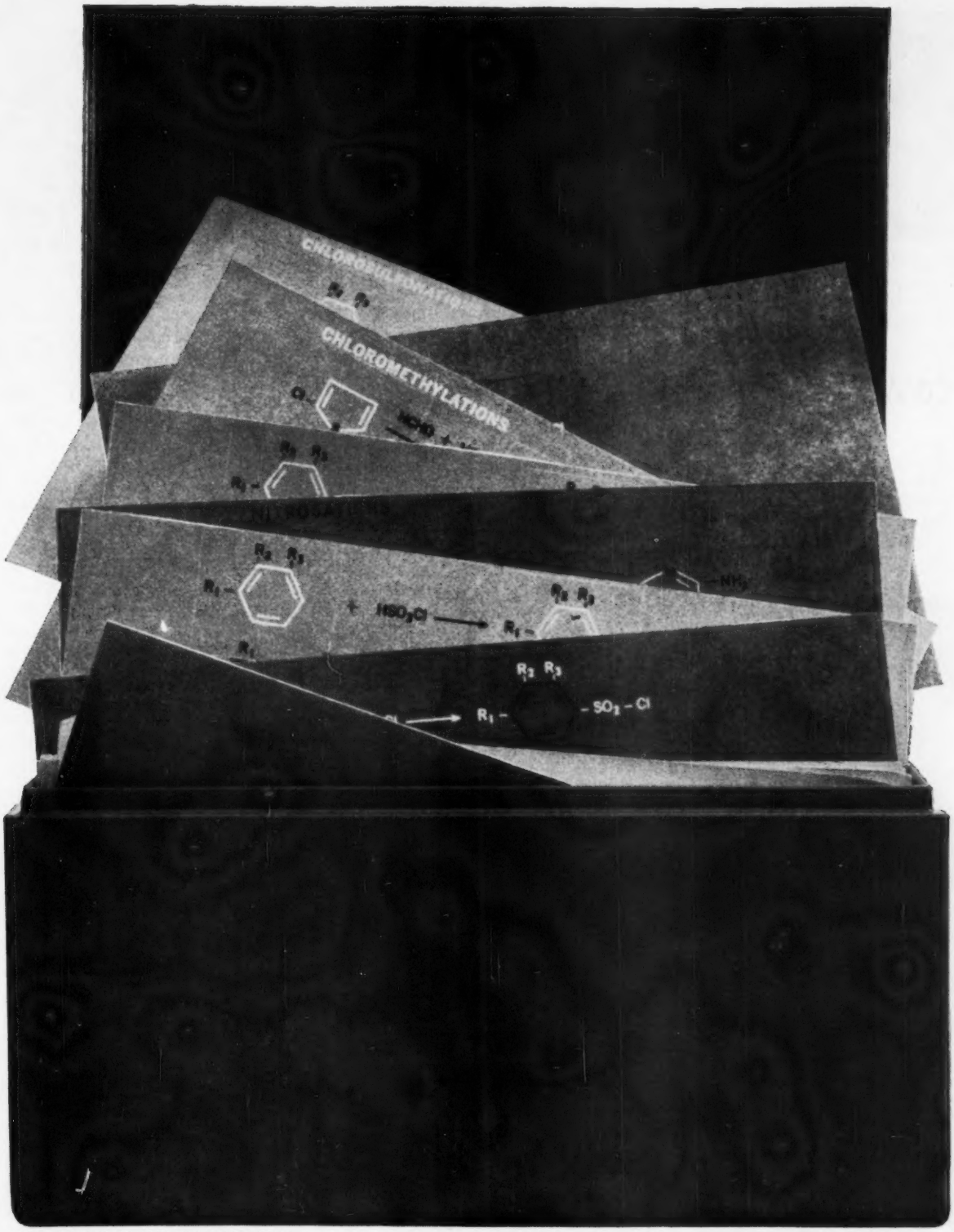
*Celite is Johns-Manville's registered trademark for its diatomaceous silica products

JOHNS-MANVILLE

JOHNS-MANVILLE JM PRODUCTS



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LETTERS

Hydrodealkylation

To the Editor: On behalf of Houdry Process Corp., I should like to compliment Chemical Week on the article "Springboard for Aromatics Plunge" (*March 4, p. 46*).

We were impressed with the thoroughness with which Mr. Ryle Miller was able to ferret and prepare the relatively inaccessible information pertaining to this subject. The story was presented in a highly interesting style. . . .

J. C. Dart
Vice-President, Sales and Service
Houdry Process Corp.
Philadelphia

To the Editor: Your summary article on hydrodealkylation makes a point about sulfur in catalytic vs. thermal hydrodealkylation processes purporting an ability to handle sulfur in the catalytic process and not in the thermal process. In point of fact, either the catalytic or the thermal process largely converts sulfur into hydrogen sulfide. Under the high temperature and pressure conditions existing in a hydrodealkylation reactor, any metallic reactor, even stainless steel, is subject to corrosive attack by hydrogen sulfide. It is, therefore, advisable to desulfurize beforehand to avoid such corrosion and for this reason the Atlantic-HRI HDA process proposes desulfurization prior to hydrodealkylation.

Charles C. King
Vice-President
Hydrocarbon Research, Inc.
New York

Exports and Investment

To the Editor: . . . I have read with interest the article "Coming: New Crimp on Foreign Investment?" (*Feb. 18, p. 35*).

Have you noticed with regard to this subject that many people propose that exports should be expanded but direct investments restricted? I feel sure that there is an inherent mistake in this treating of exports and direct investment as two completely segregated facts. I feel reasonably confident from my own experience that a very large part of U.S. exports abroad is related directly to American investment abroad in plants that draw on America for intermediates or raw materials. I think furthermore that other returns of income to this country, such as royalties and engineering fees, are also closely related to investments.

To put it more generally, I think that our international business is, to a large extent, a combination of many facts and not a series of isolated things such as many might tend to think it is who are not close to it. As a result I am completely convinced that if restriction is put on investment abroad, it not only will do the obvious—cut down on return from that investment—but also will cut exports and the income classified under "miscellaneous services" covering royalties, fees, etc.

This is not even to begin to go into the harm it would do for America to hand over the new frontiers of business throughout the world to West European and Japanese interests. I wonder to what extent West European and Japanese concern about competition from American industry is reflected in this widespread and puzzling attack in America on investment abroad.

John J. Powers, Jr.
President
Pfizer International Inc.
New York

MEETINGS

Organic semiconductors conference; sponsors: Armour Research Foundation and *Electronics* magazine; Morrison Hotel, Chicago, April 18-19.

Southeastern Instrument Society of America, conference and exhibit, Charlotte, N.C., April 19-21.

American Institute of Chemical Engineers, New Jersey section, spring lecture series, topic: "The Statistical Design and Interpretation of Experiments"; research auditorium of Union Carbide Plastics Co., River Road (State Route 18), Bound Brook, N.J., April 20, 27.

Parenteral Drug Assn., Edgewater Beach Hotel, Chicago, April 21.

American Ceramic Society, annual meeting, Royal York Hotel, Toronto, Ont., Can., April 23-27.

American Institute of Mining, Metallurgical and Petroleum Engineers, Southwest mineral industries conference; Las Vegas, Nev., April 24-25.

American Assn. of Cost Engineers, Metropolitan New York Section, fourth annual meeting, Hotel Manhattan, New York, April 25.

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For further details, see Nopco's section in Chemical Materials Catalog, pages 212-213

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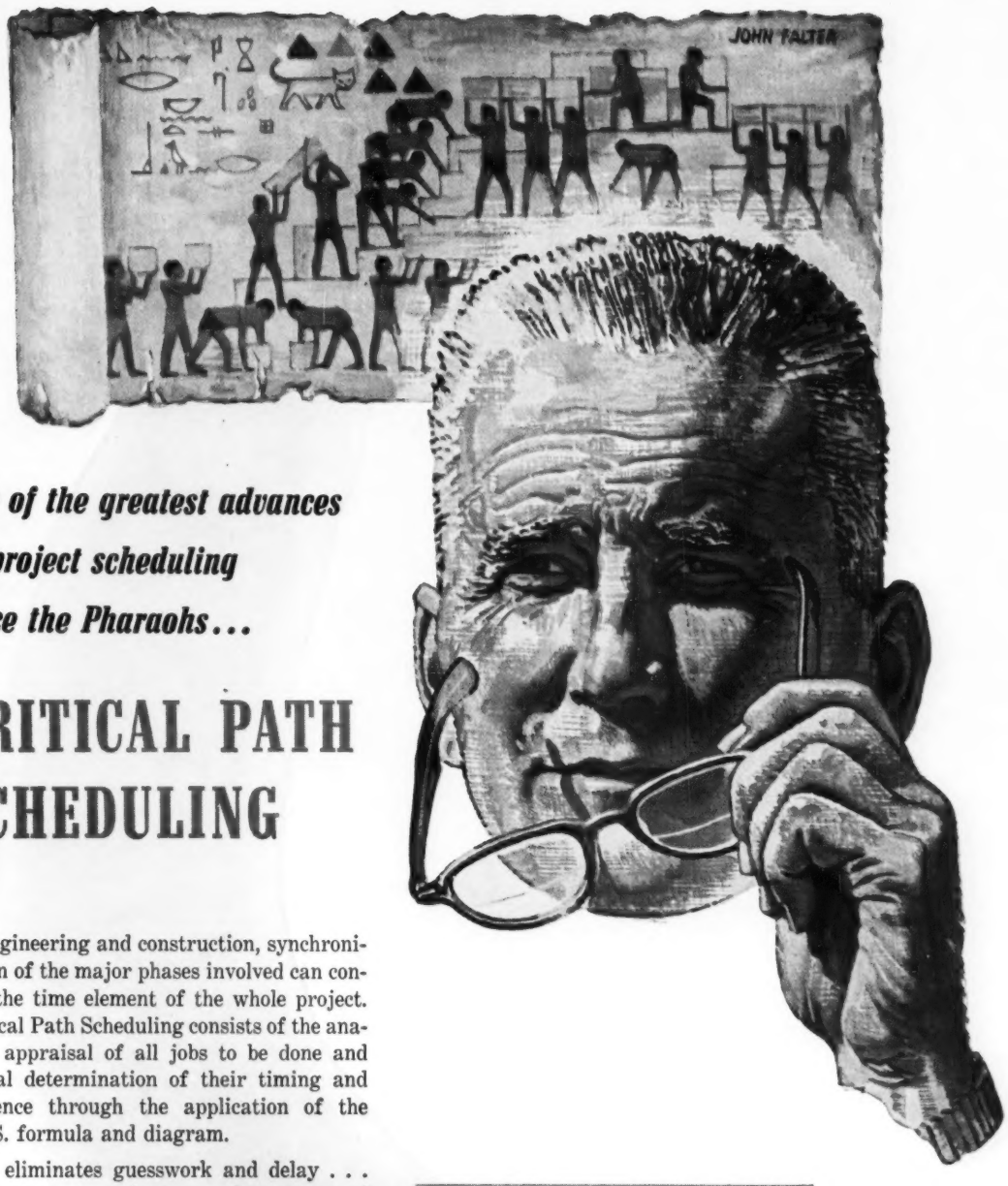

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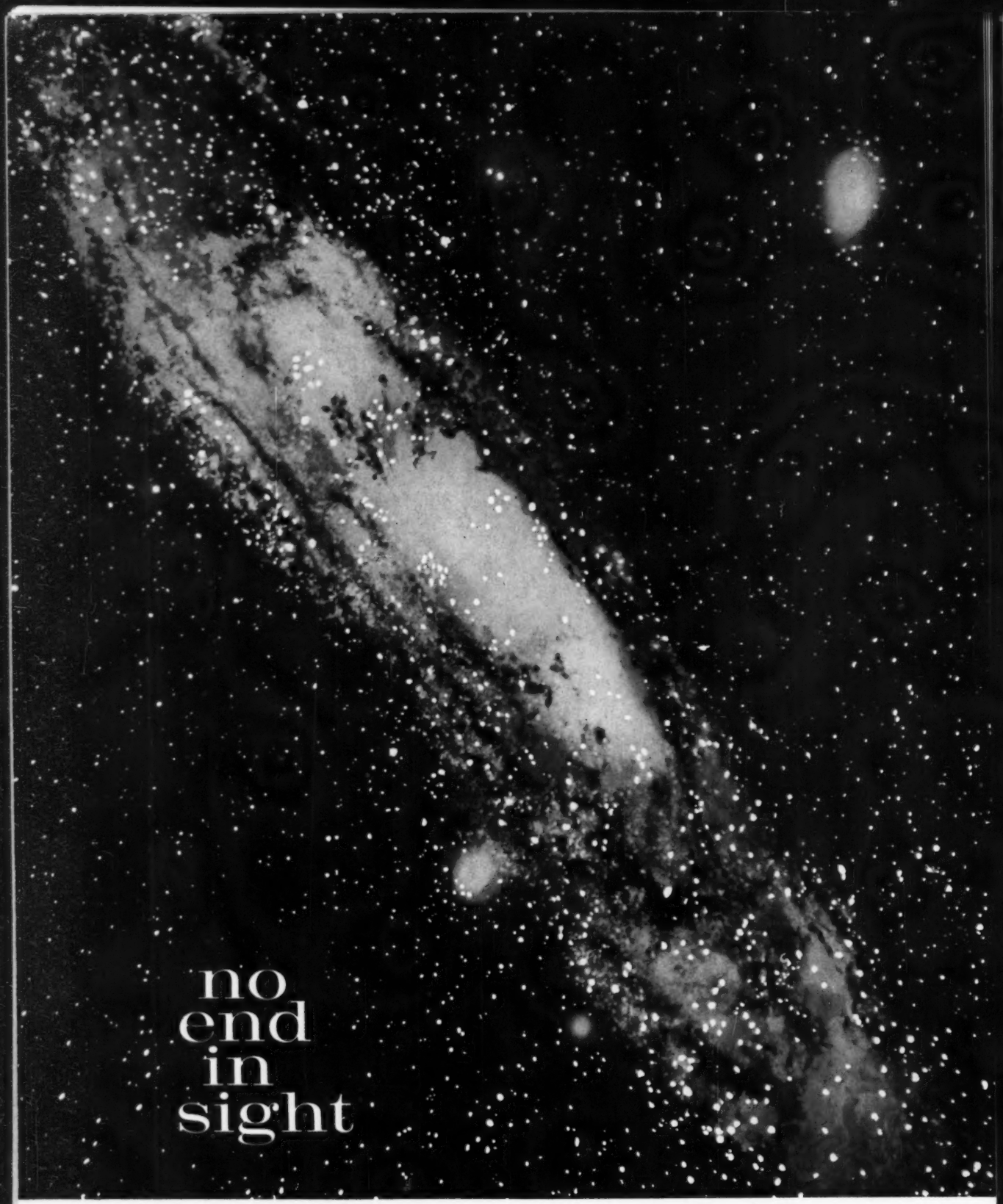

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Worst Is Over: Sales Pace Quickens

The nadir of the 1960-61 recession apparently has been passed, and chemical companies see the first definite signs of an upturn. Their March sales were noticeably better than January or February rates, picking up week by week during the month (*p. 121*).

Biggest selling chemicals in March will probably prove to be agricultural and other specialty chemicals, plastics and building chemicals. These have shown a greater sales increase than usual seasonal fluctuations would account for. Industrial and inorganic chemicals are the slowest-moving products, lagging behind last year's figures at many companies.

Encouraged by such evidence the majority of companies in a CHEMICAL WEEK nationwide spot survey "believe" the upturn has started. But they mix caution with hope; the real increases they say, will come in the second quarter. The latter half of this year, it's almost completely agreed, will be far stronger than the last six months of '60.

Companies give mixed reasons for their faith in an upturn. One company places its belief in the "considerable optimism among our customers and competitors" as well as the previously mentioned increase in sales. A more cautious company admits its sales in March were up 50% over abnormally poor winter months, but still won't call this an upturn, yet.

A major cause of increased business, of course, is the current build-up of inventories. Many companies had allowed raw material inventories to get unusually low while waiting to see what would happen to the economy. The fairly sudden signs of upturn caught them with supplies down, ill equipped to meet demands.

No one can yet call wrong either the company that says "We're still on the downswing," or the executive who believes "the chemical industry is now in an upturn." But there's no getting away from the fact that products are moving faster, and companies are now planning with an upswing in mind.

Chemical Week / APRIL 15, 1961

Ahead: Import-Export Shift

Economic forces gaining strength this week seem likely to put a check-rein this year on what has been a galloping export-import trade.

Primarily, the halt will be to exports; imports may run even faster. The U.S. business recovery now gathering steam (*see above*) makes probable this pickup in chemical imports. Last year, the rise was only 1.7%, possibly because most big chemical-consuming industries were operating at low levels—especially during the last six months.

And the construction of numerous new chemical plants overseas—in many cases U.S.-backed—augurs against a '61 gain in chemical exports equal to last year's 12.7% jump.

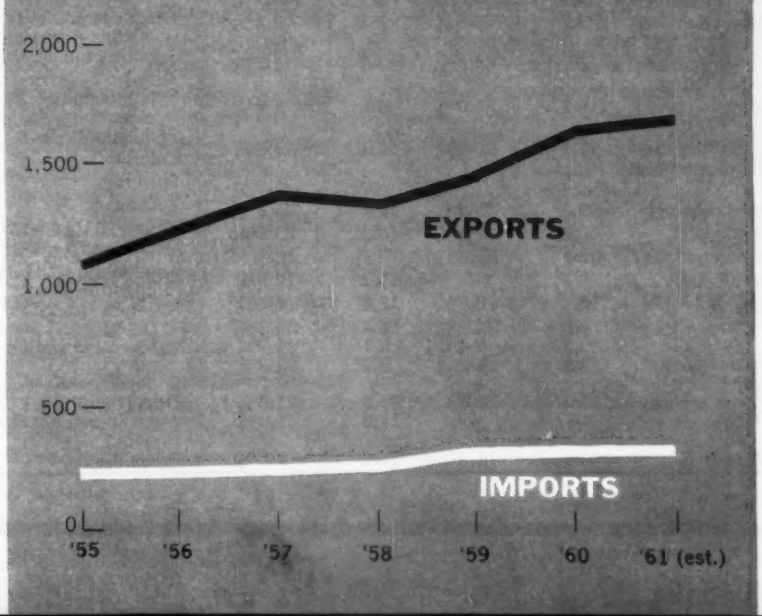
Biggest Trade Balance: Last year's trends—reinforced by the business slowdown that both discouraged imports and also turned domestic producers toward the export market—combined to produce an unprecedented surplus of chemical exports over imports (*chart, right*). Never before has the chemical industry played so heavy a role in the U.S. export trade. Back in '57, when U.S. exports on all types of goods hit a $20.7-billion peak, chemical exports (not counting synthetic fibers and synthetic rubbers) accounted for 6.76% of the total. Last year, total U.S. exports came to $19.4 billion, and chemicals' share was up to 8.68%.

Scores of sharp increases and decreases marked last year's U.S.-foreign trade in chemicals (*table, p. 40*). Among large-volume items, most of the one-year changes ('60 vs. '59) were more than 10%.

One major turn-around situation concerns benzene. Last year's imports dropped by one-third, while exports more than tripled; and this year the U.S. may become a net exporter of this important product (*CW, March*

U.S.-Foreign Trade in Chemicals and Allied Products

(Yearly total values in million dollars. Sources: U.S. Dept. of Commerce and CW estimate.)



IMPORTS-EXPORTS 1960

1960 CHEMICAL EXPORTS: Up 12.7%, to $1,680.1 million

(All figures in millions. Source: U. S. Dept. of Commerce)

Commodity	Quantity*	Change from '59	Value	Change from '59
Benzene (gallons)	23.6	+222.6%	$ 8.95	+282.5%
Toluene	367.9	+ 62.4%	9.6	+ 59.6%
Phenol	48.4	+ 22.9%	7.2	+ 21.1%
Phthalic anhydride	16.5	+302.1%	3.7	+494.3%
Phthalate esters, all types	56.9	+ 86.3%	22.9	+ 78.8%
Styrene monomer	158.0	+ 96.3%	19.0	+ 80.3%
Antioxidants, rubber-compounding agents, coal-tar and other cyclic	11.8	+ 6.3%	8.0	+ 14.0%
Color lakes and toners, coal-tar and other cyclic	2.5	— 19.0%	4.8	— 5.0%
Vitamins and vitamin preparations	—	—	31.3	— 0.5%
Polio vaccine, all forms	—	—	3.4	— 51.9%
Prednisolone and preparations	—	—	12.3	— 32.1%
Antibiotics and compounds	—	—	95.3	+ 2.3%
Antibiotic and vitamin feed supplements	26.4	+ 2.8%	11.9	— 1.2%
Copper sulfate	29.7	+455.5%	3.4	+400.6%
DDT and formulations	—	—	30.8	+ 31.0%
Herbicides from 2,4-D and 2,4,5-T	8.8	+ 52.7%	4.25	+ 59.5%
Agricultural insecticides and formulations	—	—	34.0	+ 4.5%
Fungicides	19.9	+ 35.7%	11.1	+ 38.2%
Household and industrial pesticides	21.0	+ 16.0%	6.7	+ 10.9%
Disinfectants	11.3	+ 12.7%	4.9	+ 20.0%
Textile specialty compounds	28.3	+ 4.1%	9.2	+ 11.9%
Styrene resins	133.1	+ 18.1%	31.7	+ 14.9%
Alkyd resins	37.9	+ 19.3%	11.8	+ 15.7%
Vinyl resins	76.3	+ 35.4%	22.9	+ 14.5%
Tar-acid resins	25.0	— 2.0%	8.4	+ 5.3%
Urea, melamine and other amine resins	22.8	— 8.2%	7.8	— 14.2%
Polyethylene resins	330.4	+ 8.0%	92.7	— 2.6%
Acrylic and methacrylate resins	18.1	+ 21.4%	6.0	+ 30.2%
Ion-exchange resins	9.5	+ 31.9%	5.2	+ 33.6%
Other synthetic resins	53.6	+ 55.0%	26.9	+ 89.9%
Polyethylene film and sheeting	3.7	— 21.5%	2.3	— 9.2%
Other synthetic resin film and sheeting	26.2	— 4.8%	28.0	+ 1.7%
Synthetic resin laminates	5.7	— 30.8%	6.6	— 7.6%
Cellulose plastics and compositions (except scrap)	31.9	+ 20.6%	26.8	+ 14.6%
Regenerated cellulose	29.2	+ 39.4%	11.7	+ 21.2%
Detergent alkylates	80.8	+ 22.9%	9.3	+ 23.8%
Antiknock compounds	65.7	+ 45.2%	22.7	+ 39.0%
Oil additives	—	—	45.1	+ 16.9%
Ethylene glycol	110.1	— 15.6%	12.5	— 12.5%
Butanol	79.6	+ 72.1%	10.4	+ 86.3%
Glycerin	20.0	— 6.4%	5.1	— 1.7%
Organofluorine compounds	13.9	+ 28.6%	5.0	+ 22.3%
Boric acid and borates	601.2	+ 18.5%	25.6	+ 21.5%
Sodium hydroxide, all forms	—	—	14.5	— 9.4%
Carbon black (contact)	146.1	— 11.2%	16.9	— 4.0%
Carbon black (furnace)	397.0	+ 13.9%	$32.7	+ 16.0%
Titanium dioxide and other titanium pigments	67.3	— 7.2%	10.0	— 5.3%
Ammonium sulfate fertilizer	474.6	— 40.6%	6.7	— 48.2%
Ammonia for fertilizer	187.9	+ 57.6%	7.0	+ 52.9%
Ammonium nitrate fertilizer	73.9	— 54.9%	2.4	— 51.8%
Urea fertilizer	132.8	+ 2.8%	5.6	— 0.2%
Florida phosphate rock (tons)	4.14	+ 31.6%	30.6	+ 33.7%
Concentrated superphosphate fertilizer (tons)	0.3	+ 3.1%	17.0	+ 5.2%
Potash (tons)	0.8	+ 48.8%	22.3	+ 46.9%
Dynamite	21.9	— 2.3%	3.9	— 7.9%
Other explosives, fuses, etc.	—	—	9.3	— 1.3%

* Unit is pounds unless otherwise stated.

1960 CHEMICAL IMPORTS: Up 1.7%, to $353.1 million

(All figures in millions. Source: U. S. Dept. of Commerce)

Commodity	Quantity*	Change from '59	Value	Change from '59
Benzene (gallons)	38.1	— 33.5%	$9.2	— 33.4%
Napthalene	41.4	— 29.9%	3.3	+ 40.0%
Acetanilide	1.9	— 66.2%	1.9	— 71.9%
Phthalic anhydride	3.9	— 75.4%	0.7	— 74.1%
Coal-tar colors, dyes, stains	3.6	— 5.2%	10.5	— 4.2%
Coal-tar medicinals	2.45	— 13.3%	11.8	— 10.9%
Phenolic and other coal-tar resins	0.6	— 85.8%	0.75	— 69.7%
Caffeine	0.9	— 21.5%	1.6	— 26.8%
Menthol (natural)	0.9	+ 22.5%	5.3	+ 57.1%
Menthol (synthetic)	0.2	+108.7%	0.9	+174.1%
Tetrachloroethane	30.4	+165.9%	1.3	+122.5%
Trichloroethylene	59.1	+ 14.1%	4.14	+ 12.9%
Vinyl acetate monomer	42.6	+ 8.3%	7.1	+ 6.7%
Polyvinyl acetate	1.64	— 30.1%	0.8	— 12.6%
Other polyvinyl resins	11.6	—	2.0	—
Tartaric acid and anhydride	3.74	+ 1.8%	1.23	+ 0.9%
Chloroacetic acid and anhydride	11.1	+ 20.6%	1.7	+ 19.5%
Ethyl alcohol (gallons)	20.2	+3,640.9%	4.4	+3,571.9%
Glycerin	18.3	+ 43.9%	3.1	+ 43.9%
Sodium sulfate, crude (long tons)	0.15	+ 38.2%	3.4	+ 37.6%
Sodium cyanide	17.2	— 36.2%	2.3	— 26.1%
Other cyanide salts and mixtures, except potassium cyanide.	29.5	+114.1%	1.6	+ 87.7%
Alumina hydroxide for production of aluminum	175.6	— 31.0%	5.7	— 33.4%
Perchloroethylene	22.1	(Up)	1.7	(Up)
Chlorine	53.4	+ 60.2%	1.85	+ 56.6%
Furfural	32.0	— 20.3%	3.2	— 17.0%
Zinc oxide	25.1	— 23.8%	2.6	— 21.0%
Ammonium sulfate fertilizer (tons)	0.2	— 2.8%	7.4	— 8.9%
Ammonium nitrate and mixtures (tons)	0.25	—	12.6	—
Nitrogen solutions (tons)	0.05	—	2.4	—
Calcium cyanamide (tons)	0.04	— 24.5%	2.6	— 30.8%
Sodium nitrate (tons)	0.34	— 26.9%	10.9	— 17.9%
Urea (tons)	0.08	+ 28.8%	7.1	+ 18.1%
Ammonium phosphate (tons)	0.12	— 44.4%	7.5	— 45.2%
Potash (tons)	0.33	— 2.5%	9.2	— 1.3%

* Unit is pounds unless otherwise stated.

25, p. 39). Similarly, major increases in petrochemical capacity are making the U.S. more self-sufficient in naphthalene, although there's still a shortage (*CW, Dec. 10, '60, p. 85*).

Cyclics Climbing: Exports of various other principal aromatic industrial chemicals also were up substantially last year, with phthalic anhydride shipments up more than fourfold. Meanwhile, imports of these and other major coal-tar chemicals tumbled sharply from '59 levels.

In synthetic resins—a field in which the U.S. chemical industry has long held a dominant position—exports surged again. This time they topped $200 million in total value. Polyethylene accounted for about 45% of that figure. Biggest individual gainers were vinyls and certain newer resins not yet reported separately.

But there were setbacks in resin exports too. Shipments of amine-type and tar-acid resins were down. And the drop in polyethylene prices was more than enough to offset the relatively small increase in pound-volume exports of that resin. There's a feeling that synthetic resin exports as a whole are about due for a levelling off.

As usual, there are a number of instances in which imports are up enough to worry domestic producers. One example: glycerin. Also, three chlorinated solvents are coming into the U.S. in decidedly larger volume (*CW, Dec. 24, '60, p. 73*); and although imports of sodium cyanide are off, imports of other cyanides more than doubled.

In fertilizers, imports are generally down; exports, mostly up. However, there's still lots of traffic both ways. The U.S. was a net importer of urea last year, and—despite the strength of its domestic phosphate industry in Florida, Tennessee and in the Northwest—has been bringing in some phosphate materials from the Netherlands Antilles.

The growth in overseas chemical markets last year helped make up for part of the slowdown in domestic outlets; and for some producers, exports made the difference between profit and loss. But over-all, exports are still relatively small for the U.S. industry as a whole. The biggest-yet boom in exports last year brought chemical exports to only 6.1% of total sales; and this year, that ratio will probably be even less.

Setback for Shippers

Chemical shippers that now receive special mileage allowances of $12-16/car on shipments of sulfuric acid and some solvents stand a good chance of losing them. Last week the Interstate Commerce Commission ruled such allowances unlawful and ordered them canceled.

The commission held that the allowances depart from the traditional method of providing such rate concessions and therefore discriminate against other users of tank cars.

Under the rate schedule that became effective in late '59, the railroads granted the allowances on shipments of 40-300 miles in so-called official territory—New York, Pennsylvania, Ohio, most of Illinois and portions of Maryland and West Virginia. The allowances amounted to $12.50/car on alcohols and solvents and $15.50/car on sulfuric acid, and went to shippers furnishing their own or leased tank cars of 8,000 gal. or more capacity.

This was in addition to the usual mileage allowance of 5.5¢/car-mile paid to the car owner or lessee. (Rail carriers have long paid, with ICC approval, allowances on a mileage basis on tank cars they do not themselves provide.)

In this instance, the railroads offered per-car allowances in addition to the traditional mileage allowance in an attempt to regain short-haul traffic lost to tank-truck carriers. The offer also represented an incentive to shippers and producers to invest in tank-car equipment of their own.

The Manufacturing Chemists' Assn. had supported the new allowance. The National Tank Truck Carriers opposed it and asked for the ICC inquiry.

In its ruling, the commission said it is well established that a shipper furnishing an "instrumentality of transportation" for use in a common-carriage movement is entitled to payment for such use on a basis that will cover his costs, including a fair return on investment. But the law also says that reimbursements that carriers make to shippers in such instances must be uniform and apply to other shippers in the same class.

It's too early to tell just what the railroads will do about the ruling. They could file for a reconsideration or possibly take the case to the courts.

Reeves' Karrh: A new division and a new polypropylene fiber plant.

Race for a Fiber 'First'

Reeves Brothers (New York) and Hercules Powder are racing to be first to start up a commercial polypropylene multifilament fiber plant in the U.S.

Commercial, in this case, means 5-10 million lbs./year. Reeves hopes to get a plant of that size in operation "within the next few weeks"; Hercules will have a 10-million-lbs./year plant going by June or July.

Reeves has set up a new Fiber Division (its former Plastics Division renamed) to produce and sell PP and other polyolefin fibers. The division will be headed, as before, by John Karrh. Reeves is now buying resin from Hercules, but plans to buy from Shell's Woodbury, N.J., polypropylene plant when it comes onstream.

Initial marketing efforts will be aimed at makers of home furnishings, particularly carpets, where spun-dyed material will be satisfactory. Current piece-dyeing techniques can give only a limited color range—one of several factors keeping PP from the big apparel markets. A breakthrough is not needed; just an amalgamation of techniques now known.

Other polypropylene multifilament makers may be along soon. Montecatini's Novamont subsidiary plans to have a 25-million-lbs./year unit at Neal, W. Va., onstream by early '63. AviSun has put off its multifilament plans.

Olin's Copps: Planning a buildup in petrochemicals, related specialties.

Building for Organics

Intentions of building a major business in petrochemicals and related specialties are seen in Olin Mathieson's latest reorganization move. It is setting up an Organics Division based on units formerly within the Chemicals and Energy divisions.

Initially, the Organics Division will take over the company's organic chemicals plant at Doe Run, Ky.; the automotive and specialty chemicals facilities at Rochester, N.Y.; and all of the Energy Division's activities that will be left under the Olin flag following the planned establishment of United Nuclear Corp. (*CW Business Newsletter, March 18*).

Heading the Organics Division will be D. J. Carroll Copps, 55-year-old corporate vice-president. Well known in the explosives industry—he was with Atlas Powder for 27 years and held the post of senior vice-president there—he transferred to Olin in '57. Up to now, Copps—who holds a mechanical engineering degree from the University of Virginia—had been general manager of the Energy Division. John O. Logan, also a corporate vice-president, will continue as general manager of the Chemicals Division.

Last week, Olin purchased for cash the Cooey Firearms Co. (Cobourg, Ont.), producer of rifles and shotguns. This operation will be continued as a branch of Olin's Winchester-Western Division.

Big Plans for New Site

Food Machinery and Chemical is confident that it is high bidder on the South Charleston, W. Va., Naval Ordnance Plant offered by the General Services Administration (*CW, March 11, p. 24*). If the government accepts FMC's $4.32-million bid, the firm will immediately begin construction of a plant to make a chemical that has "never been produced in the Kanawha Valley, but is being made now by FMC." This plant will be on the riverfront; the rest of the property will be developed into industrial sites for FMC and others.

In another GSA deal International Paper Co. will probably get all or most of the Shumaker Naval Ammunition Depot being auctioned at Camden, Ark. Of the site's 64,000 acres, 54,800 are in timber. International bid $8.15 million for the entire property, was followed by Brown Engineering (Houston), which bid $8.1 million. Brown may get part of the land on an item bid basis.

Among other GSA-held chemical plants up for sale this year: Nelco magnesium plant, Canaan, Conn.; Cramet titanium plant, Chattanooga, Tenn.; magnesium plant, Luckey, O.; and Diamond magnesium plant, Painesville, O.

Salt Stock Soars

Development of an economic desalting process could trigger a more than $40-million windfall for San Francisco's Leslie Salt Co. Realization of this by investors has recently stirred activity in the company's few available shares of stock (most are locked up in large blocks), has caused the price to move from $62 to about $72 in less than a month.

Leslie has more than 40,000 acres of land bordering San Francisco Bay, prime property in the booming California real estate market. The land is now used to produce salt by the solar method: salt water is left in shallow ponds to evaporate. Leslie is working with companies developing desalinization processes for drinking water, hopes to be able to recover cheaply refinable salt by using one of the methods. Doing so would free the real estate for sale at what local experts estimate would be a minimum of $1,000/acre.

One cloud lies over Leslie's head: a pending action of the Federal Trade Commission charging the company with violation of the antimerger law in acquiring Deseret Salt Co. (Salt Lake City) and California Salt Co. (Los Angeles). The complaint states that the acquisitions tended to monopolize production and sale of evaporated salt and rock salt in Western states. Leslie President Sheldon Allen contends that competition has actually increased, says the suit will be "vigorously defended."

Empire Building

Two oil companies are setting aside land to be developed as future petrochemical complexes. In the East, Tidewater Oil Co. has designated a large area (total, including refinery: 5,000 acres) around its Delaware refinery as a Petrochemical Park. Takers so far are Diamond Alkali, which has acquired 400 acres of riverfront land, and Stauffer, which has set up a carbon disulfide plant on a 100-acre tract. Now under construction is a 100-million-lbs./year petroleum naphthalene plant, a joint operation of Tidewater and Collier Carbon and Chemical.

In the Southwest, Socony Mobil's Basic Petroleum Chemicals Division is preparing for future expansion at Beaumont, Tex., by purchasing 544 acres of land adjoining the Socony refinery. Says E. H. Peters, manager of Southwest manufacturing: "We want to be prepared to share in the area's growth by having land available for our own possible future expansion or for use by possible future customers."

Second Fiddle Is Out

Warner-Lambert Pharmaceutical Co. (Morris Plains, N.J.) isn't running any more risks of losing its identity. After the collapse of two proposed mergers—first with Reynolds Tobacco, more recently with Minnesota Mining and Manufacturing, in which W-L would have become the junior partner, W-L President Alfred E. Driscoll now emphasizes that "Warner-Lambert is not for sale."

Speaking before the New York Society of Security Analysts last week, Driscoll—former governor of New Jersey—declared that the pharmaceu-

tical and chemical firm is now "actively seeking acquisitions or mergers, but only if the company becomes senior partner, doesn't lose identity." To illustrate this apparently new philosophy, Driscoll disclosed the purchase of Lactona, Inc. (St. Paul, Minn.), manufacturer of professional dental supplies. Since Lactona is a privately owned company, no company figures are available and the purchase price was not disclosed.

Although Driscoll indicates first-quarter earnings will be somewhat below those of '60, the company looks forward to an active year, pinning its hopes on acquisitions and on several new drugs. Example: within 60 days W-L's new antibiotic, Coly-mycin, will be introduced, marking the firm's first entry into the antibiotics field.

Triple-Threat Venture

If a new Canadian potash mining scheme works out, Armour Agricultural Chemical Co. will become the first U.S. company to produce all three basic fertilizer ingredients: nitrogen, phosphate and potash.

A joint venture of Armour and Pittsburgh Plate Glass Co. near Moosejaw, Sask., will attempt to take advantage of a factor that so far has stymied other Canadian potash mining schemes—water. (Both International Minerals & Chemical and Potash Co. of America have been delayed in getting their Canadian mines into production because of shaft crumbling or leakage caused by underground water.) Armour and PPG will use the water for solution mining. When pumped into the well, the water will dissolve the potash then carry it to the surface.

Test wells are now being drilled for a $1-million experimental unit. If it proves successful, a jointly owned Canadian company will be formed to produce muriate of potash on a large commercial scale.

In the venture, PPG will contribute know-how gained through experience in solution mining of common salt, will share in the profit from a commodity that is in burgeoning demand. Armour can utilize potash in its fast-growing fertilizer business. Another possibility for added profit, not talked about by the companies: shaving freight costs by pipelining the potash solution to a Great Lakes port.

national roundup

Rounding out the week's domestic news.

Companies

Hercules Powder (Wilmington, Del.) will close its dynamite plant at Ishpeming, Mich., May 15. Reason: decline of the local mining industry (biggest dynamite user in the area) and growing use of cheaper explosives.

Spencer Chemical Co. (Kansas City, Mo.) is moving to acquire Southern Oxygen Co. (Bladensburg, Md.), manufacturer of compressed gases, industrial and medical equipment and supplies. Southern has plants in Vineland, N.J., Kingsport, Tenn., Greensboro, N.C., and St. Petersburg, Fla. It's '60 sales: $12.5 million. Also, Spencer is relocating the headquarters of its subsidiary, Pittsburg & Midway Coal Mining Co. (Pittsburg, Kan.), to Spencer's general offices in Kansas City.

Union Carbide's Trace Elements Corp. has signed a five-year, $20.7-million contract to sell uranium to the Atomic Energy Commission for $9.01/lb. until April 1, 1962, and for $3/lb. after that.

Kerr-McGee Oil Industries' (Oklahoma City) Kermac Nuclear Fuels, wholly owned subsidiary since early Jan. (*CW, Jan 7, p. 25*), has acquired all the capital stock of Lakeview Mining (Lakeview, Ore.) and Gunnison Mining (Gunnison, Colo.). Both firms mill uranium-bearing ores into uranium oxide (yellowcake) under contracts with the Atomic Energy Commission.

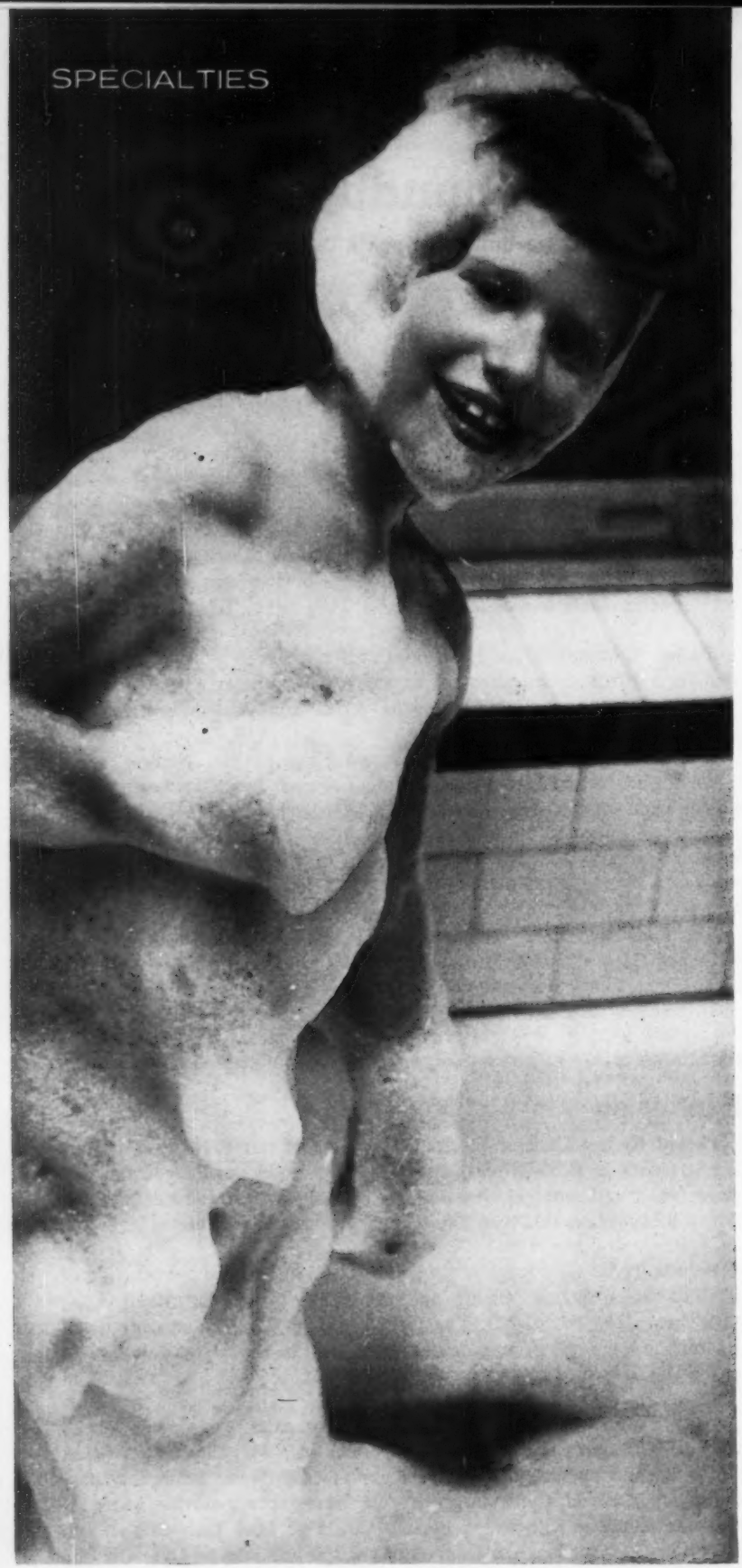
The Firestone Tire & Rubber (Akron, O.) has bought the tire division of Dayco Corp. (Dayton, O.), a purchase just approved by Dayco's board of directors. The sale does not affect Dayco's other 10 plants or its holdings in Copolymer Rubber & Chemical (Baton Rouge, La.).

Expansion

Phenol Resins: General Electric's Chemical Materials Dept. (Pittsfield, Mass.) plans a $750,000 expansion of its phenolic molding compound plant. The investment will increase plant capacity 30%. Equipment installation will begin later this year, and the new unit is expected onstream in '62.

Potash: Texas Gulf Sulphur Co. (New York) has started construction of its $30-million potash mining and processing plant near Moab, Utah (*CW, Aug. 20, '60, p. 25*). The facility—designed for initial capacity of 1.1 million tons/year of muriate of potash—will be the largest potash plant in the U.S. Expected onstream date: end of '62.

LPG, Sulfur: Petrogas Processing (Calgary, Alta.), composed of 28 Canadian oil and gas companies with holdings in the Calgary gas fields, will build and operate a $13-million gas processing and sulfur manufacturing plant at Calgary. Petrogas is now arranging engineering and construction contracts with Ralph Parsons Co., Pipe Line Technologists and Bannister Construction. Expected output: 2,200 bbls./day of LPG and 863 long tons/day of sulfur. Canada's reserve figures for LPG and sulfur now stand at an all-time high: LPG 4.2 billion bbls.; sulfur, 55.1 million l.t.



Kiddie appeal helps bubble bath makers push sales to children.

Specialty

Getting a little girl out of the tub can be almost as much trouble as getting her in—when the tub is filled with a frothy concoction of sweet-smelling suds. Bubble baths—becoming increasingly popular with the preteen set—highlight the growing market for specialty products aimed specifically at moppets.

J. Nelson Prewitt Inc. (Rochester, N.Y.) with its Matey bubble detergent and North Woods Coffee Co. (Chicago) with a somewhat similar item called Tubble are evidence of the increasing awareness of marketers that there's money to be made in designing products for children.

Some $8 billion are spent on kids under 10 each year in the U.S. And chemical specialties makers—by putting "kiddie appeal" into such items as soaps, toiletries, drugs and nutritional foods—are able to snare a part of this multibillion-dollar business. But while the products are generally easy to formulate for the special needs of the small fry, the marketing problems are man-size.

Baby Boom: The idea of a special children's market began to grow with the end of World War II, and the number of items especially tailored for those under 10 years old has been snowballing ever since. It's a market whose potential consuming power hasn't shown any signs of slowing down.

Today U.S. parents spend an average of about $600 on each child during the first year of life.

There are now an estimated 40 million in the age group below 10, and a 12% increase, to 45 million, is expected by '65. After '65, population projections show a sizable surge in the number of children under five years old.

The Old Regulars: Some of the biggest specialties companies were founded specifically to serve the baby market. The 83-year-old Mennen Co. (Morristown, N.J.) is probably the oldest baby product company in the U.S. The privately owned firm until recently had been conservative about its approach to new products. (In '58 the company introduced a new baby

Makers Take Aim at Moppet Market

powder, first new product in eight years.)

Battling for the baby market with Mennen is another old-timer, Johnson & Johnson (New Brunswick, N.J.). Credited with opening the baby skin-care market, J&J has gradually added to its basic baby line and has branched out into allied children's fields.

Last year its Tek-Hughes Division started making children's toothbrushes, which are scented with ice cream flavors. And its Chicopee Mills Division is a leader in the disposable-diaper business.

Within the last few years J&J has produced children's drugs—a liquid analgesic, cough medicine and a nasal spray. In the immediate future the company's emphasis will be on building its roster of children's drugs.

Mead Johnson & Co. (Evansville, Ind.) has been the biggest in nutritional foods for infants since 1911, when it developed Dextri-Maltose, first product of its kind and Mead Johnson's mainstay through the years. In both infant formulas and in children's vitamins, which the firm entered in the '20s, MJ is reportedly the biggest.

New Companies, New Slant: Oddly enough, the proliferation of products for children has not come mainly from the traditional companies serving this market, but from newcomers who recognized the profit possibilities in turning out products for children.

Prime example is Plough, Inc. (Memphis), pioneer in children's aspirin and other proprietaries. Donald Krause, assistant treasurer, says that Plough began to research St. Joseph Aspirin for Children at the climax of World War II when it, and a raft of other companies, began to realize that the tremendous increases in the birth rate was shaping a big market.

In '47 Plough launched the aspirin, and followed up during the ensuing six years with nose drops and cough syrup. In '59 Plough bought Paas Dye Co. and got into the Easter egg coloring market.

Also in '59 Plough began selling its children's products overseas, now reaches 86 foreign markets.

"We regard the children's market as a very sizable one for future development," says Krause, and adds that his company is working on new products.

Today nearly every pharmaceutical company has dipped into the children's field. Products include children's vitamins, which come flavored, made into easy-to-swallow liquids or chewable treats, and even soft drinks. Other medicines and cough syrups are packaged in toy-like bottles for more kiddie appeal.

Start Young: In the cosmetics field, a half-dozen companies making only children's toiletries have sprung up, and big established companies—e.g., Coty — have introduced children's lines.

Lipsticks, colognes, bubble bath, powder, nail polish, home permanents and shampoo have been reformulated to fit children's needs.

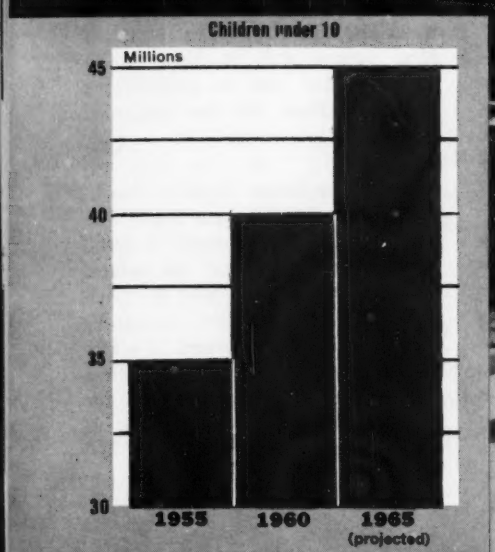
In the detergent area special germicidal products for washing diapers have tried to crack this specialized market. Both big companies (Procter & Gamble, with Germaseptic Dreft) and small firms (Diaperwite, Inc.) compete.

In the $1.7-billion toy business, imagination has spurred a number of miniature imitations of adult products. House-cleaning sets, including detergent and wax, first-aid kits, cosmetic sets, paints, printing presses, science sets, etc., all offer possibilities for specialties products. The $4-million/year Easter egg dye business gives food color and dye producers a small, but steady, market. Speedry Chemical Co. has discovered the potentials of the children's market for its felt-nib Magic Marker, originally aimed at the industrial field.

How to Sell to Kids: Imagination and knowledge of the market are the two most important factors in selling

CW PHOTO—JOAN SYDLOW

Kiddie Population Keeps Growing



in the profitable children's field. Recognizing the need for a product, developing a line with appeal to both child and parent, specialized packaging, selective advertising and promotion, choosing the right outlet, and realistic pricing are pointers for specialties makers.

One of the leading children's toiletries companies, Tinkerbell Toiletries (Englewood, N.J.), feels that its growth has been due to a combination of "smart packaging and products that appeal to the youthful imagination and the adult purchaser's pocketbook." Formed in '52 when its founders saw that retail stores were badly in need of unusual merchandise suitable as gifts and priced from $1-5, the company took its name from a familiar children's classic, Peter Pan. It carries out the motif of Tinkerbell, the good fairy, in packaging.

Although Tinkerbell Toiletries says it has not found tie-ins with celebrities necessary to sell its products, other companies have borrowed the names of movie stars for merchandising purposes. Speedry now uses the celebrity name angle in selling art sets and drawing games.

Packaging must appeal both to purchaser (the parent) and consumer (the child). Helene Pessl Inc., division of Bourjois, packages a child's soap and bubble bath set in the form of is obvious.

Avon Products Inc., packages its bath in a plastic toy that can be used after the product is consumed. Both products are typical of the appeal made to parent as well as child.

Abbott Laboratories brightens its packages of liquid vitamins with amusing figures to quell any fears of medicine.

Another approach to the kiddie market was taken by Borden Chemical Division of The Borden Co. Without any packaging changes or gimmicks, the company has exploited the possibilities of this market by coming up with interesting little projects for the children to do—using Borden's Elmer brand of adhesives products. These products are part of a booklet distributed in retail outlets where the mothers are likely to pick them up.

Captain Kangaroo Counts: Although parents are the purchasers—and consequently the prime target for advertising and promotion — the child's influence on sales is not discounted. Most companies in this market try to appeal to both groups.

Television has become the most important media for advertising—especially the kiddie programs, afternoon programs watched by women, and family-type shows in the evening. Johnson & Johnson tries to limit its advertising of baby products to TV programs watched only by women. Toy and cosmetics companies do their biggest TV selling at Christmas and other holidays.

Second in advertising value are magazines, including the women's service publications such as *Good Housekeeping*, *McCall's* and *Parents*; children's magazines such as *Calling All Girls*, *Child Life*, and sometimes comic books; and educational publications—*Scholastic*, *Arts & Activities*, etc.

Also in the promotional line are free samples distributed by many companies. J&J does much of this type of promotion. It offers baby items to drugstores at cost, which they can then distribute free to mothers. J&J also participates in the sampling program done by Bridal-Pax, Inc. (West Hempstead, L.I.), which distributes Hospital-Pax kits of baby products to new mothers in hospitals.

Selected Outlets: Drug and department stores and in some cases variety stores have been the traditional outlets for selling children's products. But the trend in the last few years has been to bigger sales by grocery stores, which continue to expand the number of items they carry, often set up special counters and give bigger play to these products—most parents take the children with them when they go shopping.

Companies that sell door-to-door are steadily making inroads into the children's field.

Many of the companies selling children's products seem to shy away from two outlets. Discount stores are not considered particularly good outlets, and variety stores are snubbed by others who aim for a prestige aura for their products.

Outlook Good: The future of the moppet market is bright. Population projections promise that the number of births in the U.S will be increasing at a steady rate. As a result the concept of merchandising products to a specialized, one-age-group market is bound to mean even bigger sales for those competing in children's products.

PRODUCTS

Pennsalt Twosome: Pennsalt Chemicals Corp. (Philadelphia) has two new products for floor repair. Flexjoint is a chemical-resistant joint filler claimed to have a high degree of load-bearing ability. A two-component resin system, it bonds to both concrete and brick, remains flexible over a wide useful temperature range. Penntrowel Latex, a tough, resilient topping for concrete floors, is a liquid latex dispersion packaged in 5-gal. steel drums. The two-component mortar can be mixed in conventional mortar boxes or concrete mixers.

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Heat-Seal Emulsion: Polymer Industries, Inc. (Springdale, Conn.), has developed a low-cost heat-seal emulsion, which is heat resistant and specially formulated for high-speed applicators and sealing machines. Polybond BK-37 is claimed to bond all types of paper, including sulfite, kraft, parchment, etc.

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Synthetic Resin: Hercules Powder Co. (Wilmington, Del.) is now selling a new synthetic resin called Pentalyn 255, which is soluble in alcohol and aqueous ammonia, has a broad range of compatibilities and has a high softening point, room-temperature hardness. Suggested applications: in flexographic and glycol-soluble inks, overprint lacquers, and polymer-type emulsions.

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Acrylic Resin: B. F. Goodrich Chemical Co. (Cleveland) is selling a new acrylic film-forming resin called Carboset 511. It is a water solution of an acrylic polymer that dries at room temperature to a clear, glossy, water-insoluble film. The product's films adhere well to metal, glass, paper, leather and to polyethylene and vinyl films. It's also suggested for aerosol hair sprays.

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Dutch Elm Saver: Chemical Insecticide Corp. (30 Whitman Ave., Metuchen, N.J.) has developed a liquid homogenized mist spray for control of Dutch elm disease. Mist Blo 26C-OF is a one-shot tree spray containing 70% less petroleum solvent. It is said to destroy pests infecting the trees and to control fungus diseases. The product does not crystallize out of chilled solutions (down to 20 F).

Washington Newsletter

CHEMICAL WEEK
April 15, 1961

A 40% increase in construction of sewage-treatment plants is needed to combat water pollution in the U.S., says the Public Health Service. This figure and those given to Congress recently by Secretary Abraham A. Ribicoff of Health, Education & Welfare (*CW Washington Newsletter, April 8*) are based on the most comprehensive survey to date of municipal polution problems.

Surgeon General Luther L. Terry says the nation needs 5,200 new treatment plants and plant enlargements, costing $2 billion. He adds it would cost about $600 million/year to build these plants and to replace obsolete ones. This goal would come within reach if, as is expected, Congress doubles federal aid authorizations from the present $50 million/-year to $100 million. Each dollar in federal funds has been matched by $4.80 in local funds.

Meanwhile, PHS has awarded a $25,200 contract to Dow Chemical Co.'s Industrial Service Division at Cleveland for research in new sewage-treatment processes. Other similar contracts will go to universities and industrial laboratories.

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Disposal of General Aniline & Film stock by the government as soon as possible is urged by Attorney General Robert F. Kennedy. He did not elaborate on his brief statement, which is likely to remain as wishful thinking for some time to come, since the General Aniline case is buried in the courts in a morass of legalisms. The Justice Dept. holds GAF shares under terms of the Alien Property Act.

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Management groups should adopt codes of ethics to help prevent a recurrence of price-fixing conspiracies, says Attorney General Kennedy. He was referring to the recent Philadelphia court case involving the nation's major producers of electrical equipment. Kennedy termed "corruption within management" an "extremely serious problem."

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A resumption of crude natural rubber sales from the national stockpile is reported by the General Services Administration. GSA sold 3,719 long tons of excess crude in March, for delivery through June, after a layoff of two months. The agency disposes of surplus rubber on a sliding scale to prevent a serious break in market prices. It halts sales when the market price drops below 30¢/lb. The March sales had no immediate effect on the market.

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An Assistant Secretary for Science and Technology seems a good bet before long for the Commerce Dept. Secretary Luther H. Hodges supports a bill submitted by Sen. Warren G. Magnuson (D., Wash.) that would create such a post. The Budget Bureau has indicated it will not oppose the measure.

Washington Newsletter

(Continued)

Incipient opposition in Congress melted considerably when Hodges and Magnuson let it be known that the proposed new post and all that goes with it would involve an expenditure of not more than $100,000/-year. Chances of passage this year are considered quite good.

Hodges is thinking in terms of a science administrator to fill the post. He would coordinate many of the research programs of the National Bureau of Standards, Weather Bureau, Coast and Geodetic Survey, Patent Office, Office of Technical Services, Bureau of Public Roads and Maritime Administration, and represent the Dept. of Commerce on top-level scientific committees.

•

A dry-chemical system to remove carbon dioxide from submarines in emergencies has been developed by the Naval Research Laboratory. It involves use of packaged dry-chemical CO_2 absorbers instead of currently used bulk quantities of loose absorbent.

The system employs a self-enclosed filter-blower apparatus holding five canisters, each containing 6 lbs. of lithium hydroxide. Under normal conditions, the unit will absorb the CO_2 produced by 35-40 men over an eight-hour period.

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Technician-demonstrators for the "Plastics-USA" exhibits in the Soviet Union this summer have been selected by the U.S. Information Agency. The four women and 11 men, ranging in age from 24 to 32, speak Russian and majored in Soviet studies in college. After briefings at several New England plastics plants, they will leave for showings of the exhibit in Kiev, Moscow and Tbilisi.

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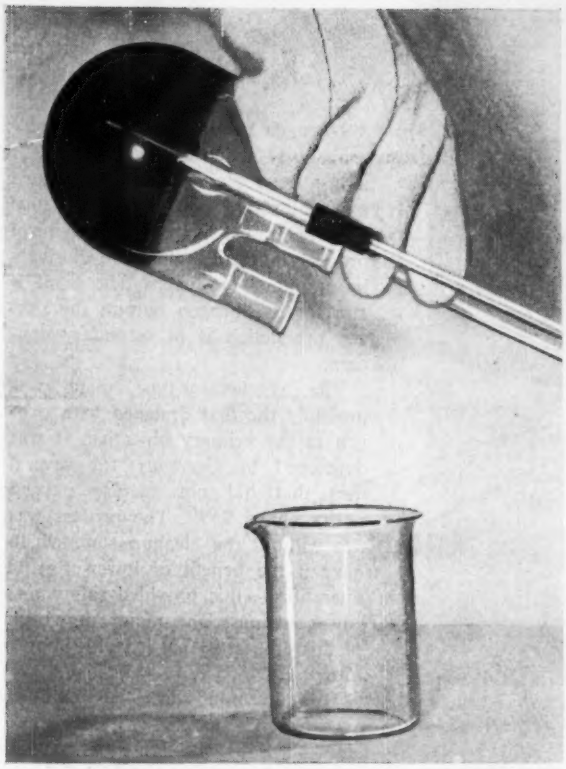
Russian advances in chemical engineering and research are evaluated in a new report by the Commerce Dept.'s Office of Technical Services. Soviet scientists have made no spectacular advances in the field, according to the report, but they do show steady improvements in such areas as absorption, adsorption, crystallization and extraction.

•

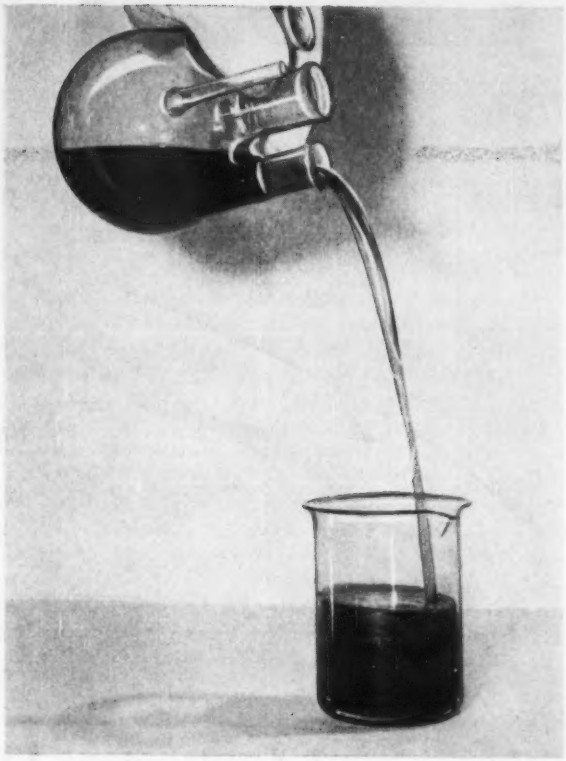
Denmark is building a brisk export business in pest-control products, according to the Commerce Dept.'s Chemical and Rubber Division. And much of the market is in the U.S. and in Latin America. Danish exports of insecticides, fungicides and weed killers in '60 exceeded $2 million to the Western Hemisphere.

•

Solid-propellant makers are pressing hard for new government development contracts. Failure of President Kennedy to provide more money for solid fuels in his space budget (*CW Washington Newsletter, April 8*) surprised the industry. Last week Aerojet-General decided it would brief the press, Pentagon officials and congressmen on the virtues of large-thrust solid-fueled rocket boosters. The company claims it can build a $1.5-million-lbs.-thrust booster within two or three years at $2/lb. of thrust. At the moment, the government seems uninterested.



33% linseed oil-modified alkyd cooked at 430°F. reaches the gel stage in 49 minutes. Acid number: 60.



With 10% of the dibasic acid replaced by benzoic acid, the resin does not gel for 75 minutes of cook time. Acid number: 30.

Reactive "Work Horse":

Benzoic Acid from Monsanto (99% Minimum Assay)

Now, for many reactions, Technical-Grade benzoic is the *lowest-cost monobasic acid you can use.* As a reactive intermediate, it might open the door to your commercialization of a little-known application. Or, perhaps improve your processing and product performance—while it increases your profits.

Technical-Grade benzoic opens the way to both cost savings and improved products in the manufacture of alkyds and polyesters. In oil-modified alkyds, benzoic acid can be used with low-priced polyols to produce better film properties at lower cost. *Quality improvements* include greater water and alkali resistance, higher gloss, better durability. *Processing improvements* include a slower viscosity build-up during the cook, more complete esterification to lower acid values before gelation. By replacing twenty percent or more of the fatty acids with benzoic acid, you can obtain faster-drying, harder resin films.

In resin making, benzoic acid modifies the internal cross-linking of reactive polybasic acids (such as isophthalic) and creates an internal plasticizing effect. Benzoic acid in the alkyd charge terminates chain formation, thus helping control molecular weight of the resin. Cuts down the viscosity in-process and improves the finished resin's solubility, too. And benzoic acid does not "block off" hydroxyl groups from reacting.

If you are interested in low-cost Technical-Grade benzoic acid just use the handy coupon. As the largest producer—including *use-tailored* grades—Monsanto is your most qualified source of supply and service. A sample of Technical-Grade benzoic acid will be furnished by request on your company letterhead.

Monsanto

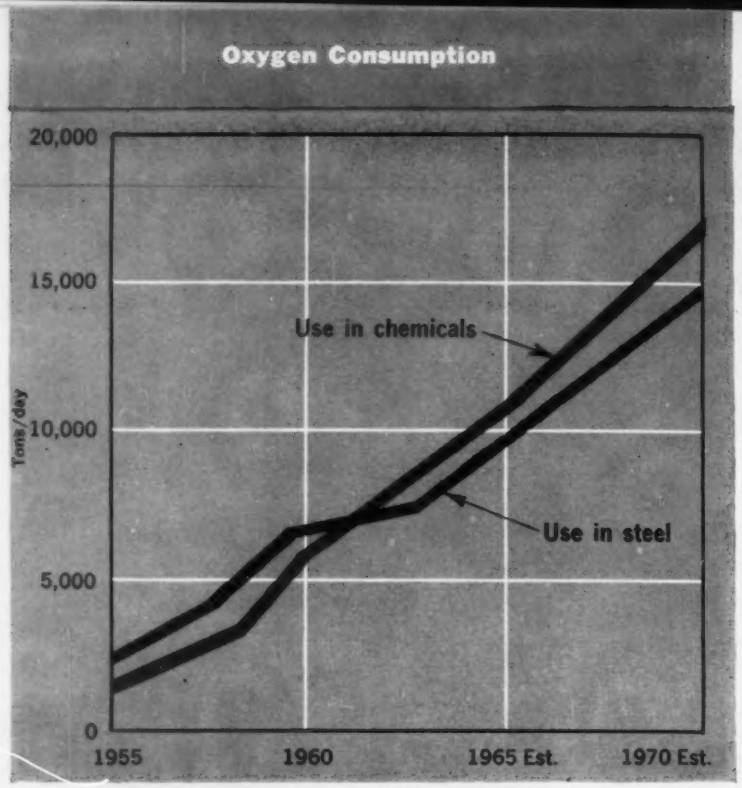
Monsanto Chemical Company
Organic Chemicals Division
Dept. 4426Y, St. Louis 66, Missouri

Please send the 21-page Technical Bulletin on applications of benzoic acid, as well as other data, to:

*Name*_____

*Company*_____

*City*_____ *Zone*____ *State*_____



Chemical Industry Draws Deeper Breath of Oxygen

Chemical processors are currently reaping the benefits of engineering know-how acquired by oxygen firms serving the steel industry. Oxidation process operators are the primary gainers—although nitrogen users benefit too—and the big result will be that the chemical process industries are now about to regain status as the No. 1 oxygen consumer.

By '70, in fact, when oxygen consumption climbs to an estimated 34,000 tons/day from today's 14,000 tons, the CPI share will rise from 43% to 50-55%.

In the last few weeks, two more oxygen plants for chemical companies made news: Air Reduction Co. (New York) has plans for a 350-tons/day plant in Claymont, Del. (*CW, March 11, p. 24*). Of this capacity, 120 t/d. will go to SunOlin's ethylene oxide unit. And production is under way at Linde Co.'s 25-t/d. plant in Cincinnati (*CW, March 18, p. 85*). This is the first on-site oxygen supply to be converted into ozone.

Big reason for the CPI's attention to oxygen: it can be more economical to use oxygen-enriched air (or relatively pure oxygen) in oxidation processes initially based on air. Indicative of oxygen's new popularity: until recently industry processes to make ethylene oxide via oxygen or air (*CW, June 28, '58, p. 74*) were about equally popular. Now, Scientific Design, a leading air-process proponent, has added an oxygen process.
gen process.

Oxygen supply is more attractive today on two prime counts: price and supply dependability. Design and engineering improvements in the four basic oxygen processes, plus changes in purchasing policies, have helped to bring this about.

Efficiency: The major advances in oxygen technology are summarized in the simplified diagrams on p. 51. Through years of engineering refinements, low-temperature air-separation processes have arrived at the point where the last few efficiency points are being squeezed out.

For example, Linde Co. has developed the proprietary know-how to fully automate its oxygen plants. It can control up to 150 instruments at key process points. By pinpointing trouble spots, automation decreases downtime and maintains better purity

Nitrogen Leads the Way: Oxygen's availability is due largely to the CPI's long quest for nitrogen. The standard oxygen process (the first in the four flow diagrams) is used in chemical process industries almost exclusively by ammonia producers. The plant is run for its nitrogen output; the oxygen production is of secondary concern.

The regenerator-type plant was probably the first designed with oxygen as the primary objective. It was developed in Germany for several uses that did not require oxygen purity above 95%. The process was run without the cleanup step, which gave it the benefit of lower-pressure operation — this provided safety and power savings. The major drawback of this process is that it yields impure nitrogen.

To overcome this, the modified low-pressure process was developed. Here the air-separation step consists of several stages by which air is cooled, expanded to cool further, and finally condensed to yield liquid air. This is distilled in all the processes to separate the various gases.

In the latest modifications of the low-pressure process, through proprietary engineering advancements, the carbon dioxide has been cleaned up and the purity increased. This engineering work was essentially the reversal of heat-exchanger stream flow and improvement of the distillation and compression equipment.

The bulk of oxygen units in CPI plants run on the modified and double-cycle schemes. The double-cycle process benefits from a split stream in which part of the incoming air is compressed as the first step of the air liquefying process.

New Additions: Besides these four basic processes, a new one is bidding for the CPI's attention. Dravo Corp. (Pittsburgh), fortified with know-how and sales rights from German Linde AG. (Munich), is out to make comparitively low-purity oxygen at relatively low cost (*CW, Aug. 20, p. 24*). Dravo also has a high-purity process (99.5% oxygen), recently licensed it to the Ford Motor Co. for steelmaking.

Instead of aiming for purities in the high 90s, Dravo is selling plants that make as low as 60% oxygen,

using pressures of 30-35 psia., rather than the conventional 71-72 psia. In doing this the firm is betting that chemical processors do not really need the high-purity oxygen they're now using almost exclusively. Dravo is said to have just lined up its first CPI customer—but it's possible that this customer will take a high-purity unit like that licensed to Ford.

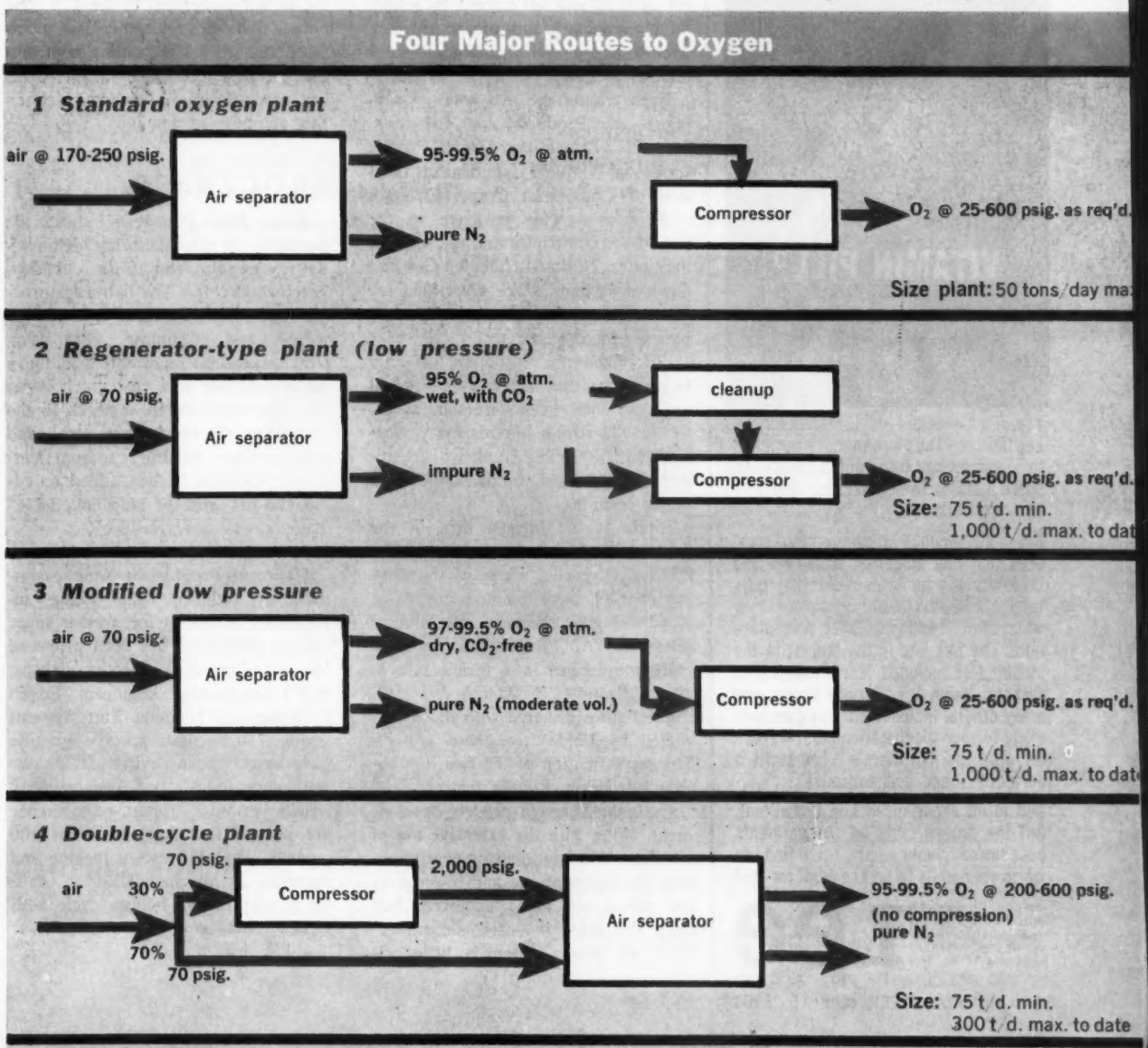
Oxygen Purchase: If they choose not to make their own oxygen, CPI firms now have several ways of buying oxygen, depending upon the location of the consuming plant and the amount needed. Small quantities, say 25 t/d. or less, can be supplied as liquid by truck or rail from numerous commercial oxygen sources. (Liquid oxygen rather than in the gas form is shipped because 826 cu.ft. of gaseous oxygen are equivalent to 1 cu.ft. of liquid oxygen under standard conditions.)

But most chemical processors need large quantities of oxygen. This can come from an on-site or nearby (over-the-fence) oxygen plant, a plant usually owned and operated by the oxygen firm.

The important matter here is not how near the plant is but whether the chemical plant is the sole customer or whether there are two or more customers sharing the output and getting a high-volume price. Although advantages are obvious, U.S. companies have been slow to try long pipelines—unlike the French, whose longest pipeline, 60 miles, is nearly four times the length of the longest oxygen pipeline in the U.S.

Forecast: In getting an oxygen supply, chemical processors no longer must forecast future needs as carefully as they once did. For now, large oxygen firms can dismantle (for assembly elsewhere) a small oxygen plant, replace it with a larger one. Oxygen plant builders are now confident that they can find new customers for the smaller units.

Competition: It's almost impossible to fix a pattern of oxygen prices because of the nature of the business and the competition. Since oxygen cost is based on local power, water and labor, required oxygen pressure and cost of capital, the prices vary widely throughout the country. There



How the CPI Uses Oxygen

Product	*Production Capacity Jan. '60 (tons/day)*	*Planned or Installed Since Jan. '60 (tons/day)*
Ammonia	1,425	—
Ammonia/methanol	940	—
Acetylene	2,530	925
Ethylene oxide	360	390
Miscellaneous	670	1,025
Total	5,925	2,340

are today more than 100 oxygen-selling firms in the U.S. In any local area, an enterprising individual can set up shop and sell oxygen by simply buying a package unit of compression, heat-exchange and distillation equipment.

Even among the five national suppliers—Air Products, Air Reduction, General Dynamics (New York), Linde and National Cylinder Gas Division of Chemetron Corp. (Chicago)—there is a wide variance in the size of the companies and the services they offer. National Cylinder Gas and General Dynamics are diversified organizations, doing a relatively small business in oxygen.

Air Products, youngest of the larger firms, developed a great deal of experience in government work, then made strong inroads into industrial work by being frank with customers, telling them exactly how oxygen plants operate.

Linde is the biggest firm in the field. And Air Reduction is in the middle. Diverging ideas in the oxygen market were pointed out when J. T. Hugill, manager of tonnage sales for Air Reduction, reported market estimates in a recent talk in New Orleans (*CW, March 4, p. 59*). These figures disagree with those estimated by Linde (*see chart, above*). The reconciliation of the two is probably just below Linde's figures.

Outlook: Through process development, along with the extensive use of pipelines and multicustomer oxygen sources, dependability and lower oxygen prices are being achieved. But since the price is based almost entirely on power, there is little potential for further gain in that area.

Between tough U.S. competition and European oxygen suppliers looking to sell equipment in the U.S., the potential oxygen customer has much to choose from. He's riding high and likely to stay in comfort—oxygen firms are ready to move in any direction that competition demands.

PROCESSES

Beech Pulp: Pilot tests indicate the possibility of manufacturing high-quality rayon pulp from fresh, debarked beechwood chips. The two-stage process used by the Research Institute for Paper and Cellulose (Bratislava, Czechoslovakia) reportedly would give white cellulose at a cost much lower than the usual sulfate method. In the first stage, the beech chips are boiled with sodium bisulfite; sodium carbonate solution is then added to adjust the pH, and the pulp boiled 1½-2 hours.

•

Hydrogen Propulsion: A new, comparatively efficient plan using superheated hydrogen for nuclear space vehicle propulsion has been proposed by two Cornell University (Ithaca, N.Y.) aeronautical engineers, Edwin L. Resler and Nicholas Rott. Systems giving 750 seconds specific impulse have already been devised by the two professors; today's best fuels attain a specific impulse (thrust performance per unit of fuel flow) of about 300 seconds. The plan uses a turbine and electrical or mechanical drive, calls for a regenerative helium cycle with a heat sink at the temperature of liquid hydrogen.

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Cellulose Acetate	X		XX				
Latex					XX		XX
Nitrocellulose	X	X				X	XX
Paints, Oil-Base		XX	XX	XX		X	
Paints, Water-Base	X	X	X	XX	XX		
Polyester Resins	XX			X			X
Polyolefin Resins†							
Polystyrene	XX					XX	
Polyvinyl Chloride (PVC)	X		XX			X	
Rubber	XX					XX	
Urea-Formaldehyde Resins							XX
Urethanes		XX	X	XX			
Varnish	XX	XX	X	X		X	

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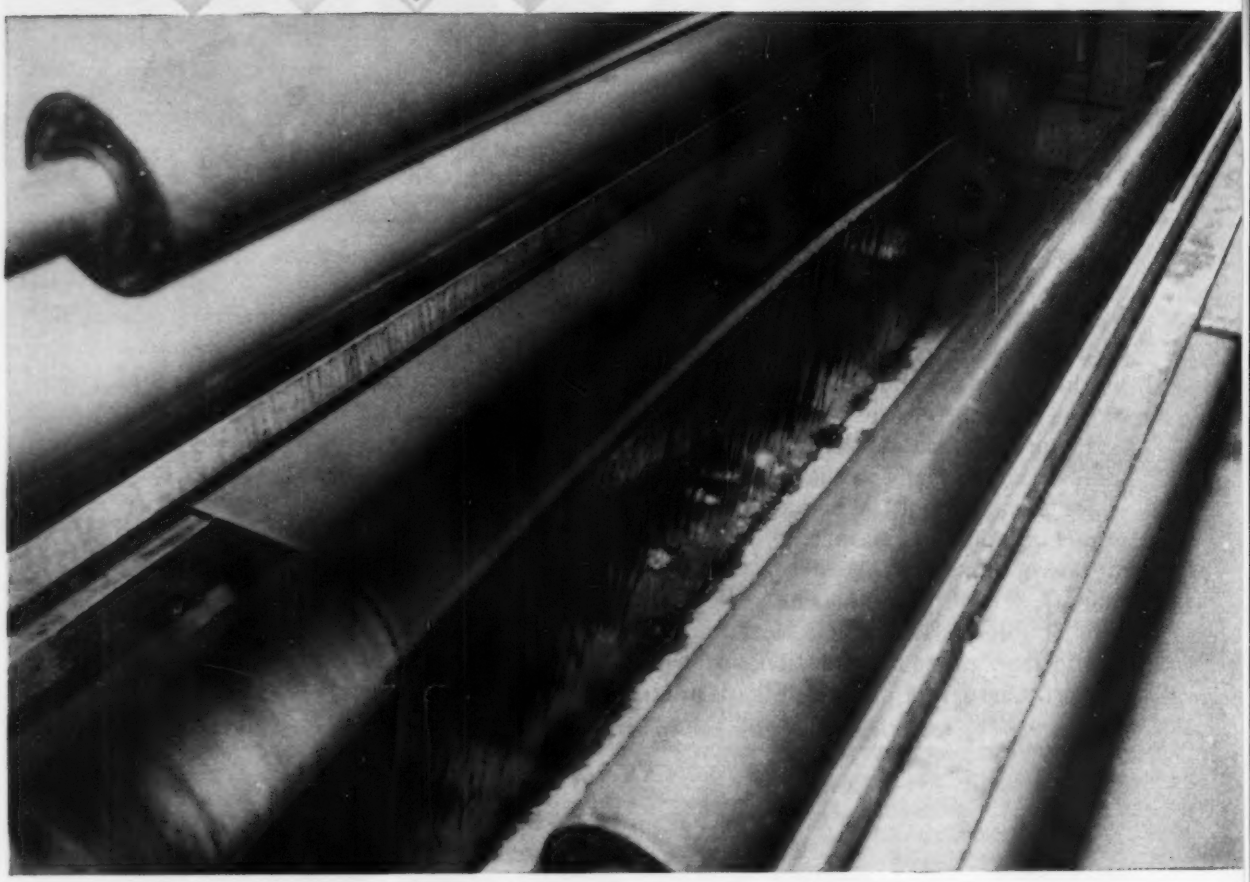

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		N-10	N-20	N-40	N-60	N-95	N-120	N-150	N-200	N-300
Specific gravity, 20/20°C	min.	0.960	1.004	1.020	1.037	1.057	1.069	1.058(30/4)	—	—
	max.	0.995	1.007	1.030	1.044	1.064	1.071	1.071	—	—
Cloud point, ml. of H_2O or °C.	min.	8.5 ml.	15.5	30 ml.	68 ml.	52°C.	50°C.	63°C.	72°C.	—
	max.	12.0 ml.	19.0	36 ml.	89 ml.	56°C.	54°C.	67°C.	73°C.	—
Color, Pt-Co scale	max.	500	300	200	200	100	200	200	200	200
Viscosity, 210°F. SUS	min.	43	47	51	57	67	74	88	—	150
	max.	48	50	54	60	70	77	90	—	170
Water, wt.%	max.	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Odor at room temperature		Not objectionable								
Appearance		All products are clear and substantially free of suspended matter.								

SELECT PROPERTIES

	N-10	N-20	N-40	N-60	N-95	N-120	N-150	N-200	N-300
Flash point (open cup), °F.	355	375	435	475	500	525	500	550	—
Weight, 20°C., lbs./gal.	8.1	8.35	8.5	8.7	8.8	8.9	8.95	9.0	9.1
Foam height, 120°F., mm. initial, 0.1 wt.%	5	5	10	12	80	110	120	—	—
Wetting time, Draves, sec. 0.25%, 1.5 g. hook	—	—	12	6	3	7	17	—	—
Freezing point, °C.	—	—	—	<0	5	14	23	34	44

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TECHNICAL INFORMATION

The information contained here is necessarily limited . . . for helpful detailed data and applications, ask for our "SURFONIC Technical Brochure" . . . Jefferson Chemical Company, Inc., 1121 Walker Avenue, P. O. Box 303, Houston 1, Texas.

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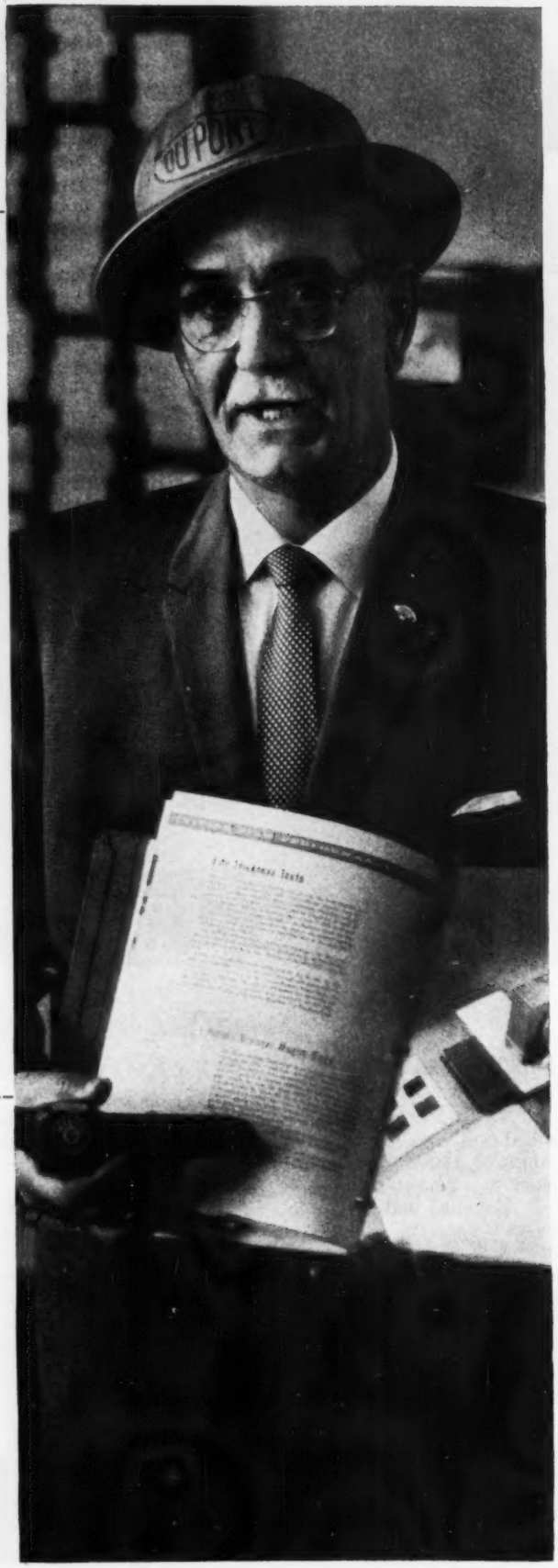

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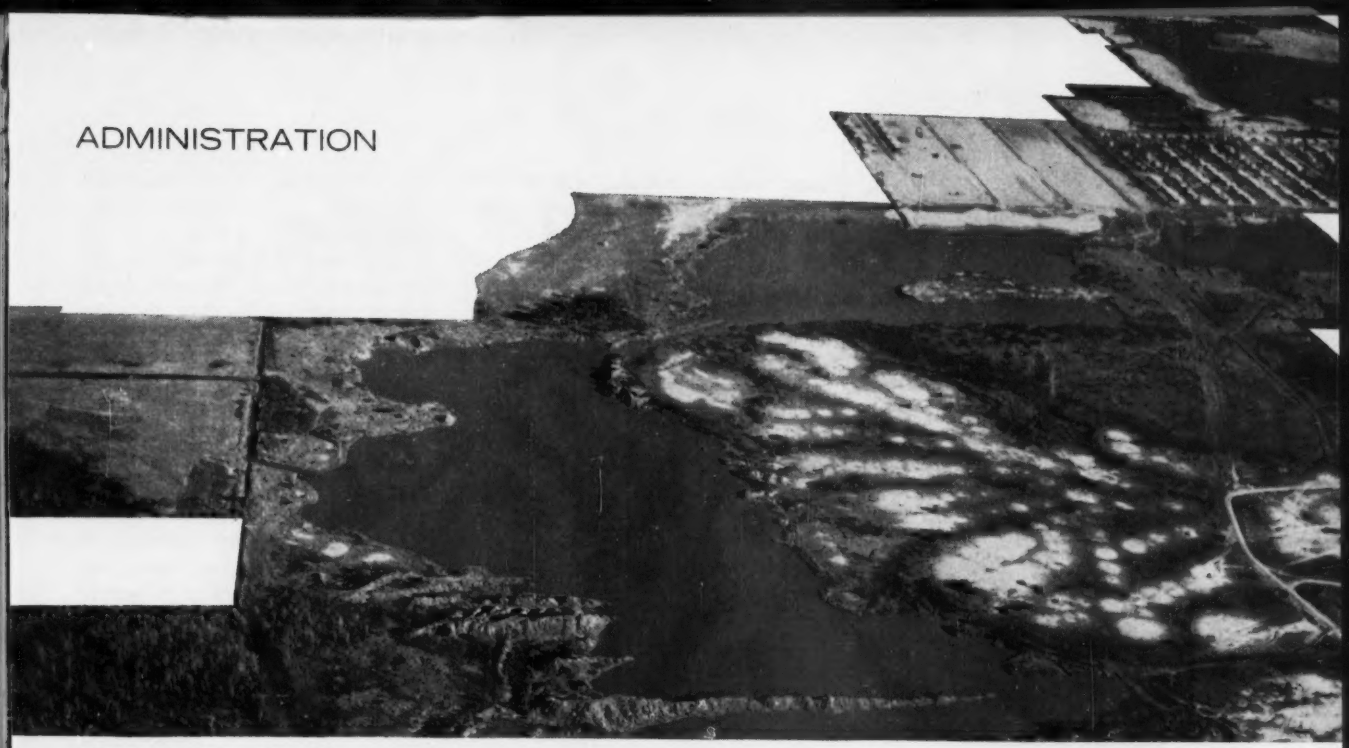

AFTER: Outline shows part of Davison's Pauway mining area after reclamation was nearly complete.

Reclaimed Land Yields Goodwill Harvest

A harvest of sorely needed good community relations is already being reaped by eight phosphate mining companies in central Florida that recently teamed up to accelerate the reclamation of mined-over land. And the move may help pay for itself through real estate sales.

Reclamation of mined areas has been practiced by some companies before; it is the promise of more firms doing it that has won public favor. So far eight of the firms making up the Florida Phosphate Council —American Agricultural Chemical; American Cyanamid; Armour Agricultural Chemical; Davison Chemical Division of W. R. Grace; International Minerals & Chemical; Smith-Douglass; Swift; Virginia-Carolina Chemical—have been confining activity to the pooling of knowledge gained in reclamation projects already completed (*CW Business Newsletter, March 11*) or under way.

Even this limited step has been greeted with approval. Editorials in local newspapers have been uniformly enthusiastic.

The *Lakeland Ledger* called the move "extremely good news," commended the phosphate companies, noted that "It has always been understood by one and all that there could not be phosphate mining without leaving mounds and pits. But the people of Polk [County] have hoped constantly that the industry would eventually do something to smooth over the mined areas as much as possible within the limits of mechanical and economic practicality."

Loyal Frisbie observed in the *Polk County Democrat*: "This is one of the most enlightened steps taken by any industry in this area in many years." [All eight companies operate in the Polk-East Hillsborough counties area.] And in *Winter Haven News-Chief*: "For over a half-century the phosphate companies have been taking rock from their lands and leaving the area looking like a battlefield. . . . among the most unsightly things in the state. We see that the Florida Phosphate Council announces that some of the companies are going to try for land reclamation.

"It's a great move in the right direction. The participating firms not only will be able to make money from

BEFORE: The Pauway mining area before improvement.

their diggings but also will be able to sell the land at a handsome profit. This land, in most instances, would be good for citrus planting. In some spots it would be excellent for residents; old swampy areas could be converted into lakes with homes built around them. These companies certainly deserve a pat on the back. . . ."

Moot Profit: Pioneers in mine reclamation, such as American Cyanamid and Davison Chemical, aren't so sure about the cash profitability of the operation. In fact, Arthur Crago, chairman of the council's land use and reclamation committee and manager of Cyanamid's Florida phosphate operations, believes that companies are spending more on reclamation than they get back. He tells CHEMICAL WEEK that the big "profit" in reclamation is improved community relations. Cyanamid has salvaged 7-800 acres, is currently reclaiming about 200 acres north of Lakeland and some 300 acres in the Dover area.

He also explains why only mined-out areas are currently considered for reclamation: usually mine pits must be used to conserve water and to dispose of clay and sand removed from the phosphate ore. "This means that it is ordinarily impossible for reclamation work to begin before the mine is worked out," Crago says. He adds that reclaimed land often cannot be used immediately for building since it must first settle.

That's not the case at Lakeland and Dover, however. So reclamation is proceeding whenever mining can be suspended. At Dover, an 18-cu. yd. dragline mines phosphate during the week, smooths out mined-over land on weekends.

Homesites? But there's little question about the eventual market for improved land. Last week Davison Chemical sold a 700-acre tract (formerly riddled with phosphate pits) for about $1 million to Interlake Builders, Inc. (Lakeland). It will provide sites for an estimated 2,000 homes during the next 10 years, is called the most ambitious housing development of its kind in Lakeland's history.

Davison mined the area, known as the Pauway properties, during '46-'59. In the past seven years, the company has reclaimed about 1,000 acres, about one-third of the total mining area. Sales of the land, including 17 acres to the city of Lakeland for a two-hole golf course, have been brisk. "Inevitably, this reclamation was a costly operation," says D. N. Hauseman, Davison vice-president for agricultural chemicals. "However, expenses of reclamation were recovered from the sale of improved properties. Reclamation was economically feasible because the area is close to the city of Lakeland, which is rapidly expanding; real estate dealing is active. Waterfront property is particularly desirable (four fresh water lakes ranging from 12 to 67 acres in area were formed by the project). We could not do the job in an area where real estate values are nominal to small."

Some of the companies are reluctant to disclose figures on mined-out land vs. total land holdings. One reason: they sometimes trade land. For example, if company A has untouched land adjacent to company B's mined-out strip, B may find it cheaper to move its mining equipment to A's land, —for which B would swap land to A for exploitation. Information on the quality and quantity of a competitor's land is invaluable in such swaps.

In recent years a number of new techniques have been developed that extend the life of what otherwise would be mined-out property. Techniques include upgrading poorer lodes, coalescing fines, etc. It's sometimes difficult to determine whether land is truly mined-out.

Other Gains: Phosphate mining companies are finding various ways to turn land holdings to advantage. Armour has reclaimed 175 acres at the edge of Bartow that will permit the town to expand, is also making a 160-acre area containing ponds available to the Audubon Society to encourage nesting of the wood ibis, a white stork threatened with extinction.

American Agricultural Chemical allows 4-H clubs and other youth groups to use some of its wooded acreage for forestry instruction. Virginia-Carolina has planted citrus groves, may handle the harvesting itself.

Such achievements are being closely watched by companies in other parts of the country confronted with the sort of community relations problems that the phosphate producers face. The rapid growth of city areas (with concomitant restrictive ordinances) frequently makes it impractical to tap nearby mineral deposits.

Harold S. Goldman, California Di-

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vision of Mines mining geologist, calls the situation "of vital concern to the mineral industry," observes that urbanized areas will rise from 16.5 million acres in '50 to 30-41 million in '80. But conservation programs permitting exploitation of mineral deposits followed by restoration of the land for urbanization may solve the problem. For example, a rich deposit of mercury ore was uncovered during grading for a housing development in Redwood City, Calif. The city granted permission to mine the ore. After a substantial quantity of mercury was recovered, the land was filled, graded, and homes were built.

For best results, the reclamation formula seems to be do-it-yourself. American Cyanamid President Wilbur Malcolm, touring the phosphate mines last week, told CHEMICAL WEEK: "We are in complete sympathy with the public's concern for land reclamation. And I'm sure that if industry doesn't do the job, then the government will. I believe industry can do it better."

LABOR

Settlements: About 250 mechanical department workers at Rohm & Haas Co.'s Bridesburg (Philadelphia) plant have received a wage increase of about 3.8% through a new contract between the company and Local 61, International Union of Operating Engineers. The renegotiated contract is for two years, has provision for a wage reopener at the end of one year.

• General Electric and Hanford Atomic Metal Trades Council (representing 19 unions at the Hanford, Wash., works) have agreed on a new three-year contract covering 3,500 workers. It provides a 3% wage increase retroactive to Oct 3, '60 (which brings the average wage from $3.11 to $3.20/hour), another 3% raise April 2, '62, an eighth paid holiday, and a fourth week of vacation after 25 years' service.

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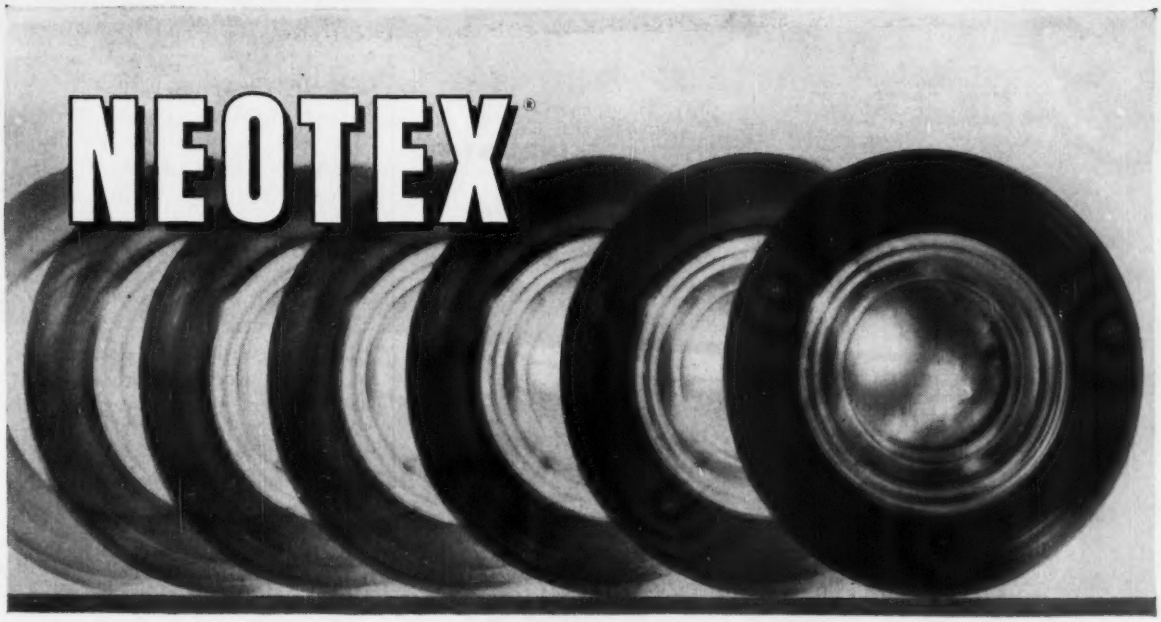
Union Balkers: Process control chemists at Goodyear Tire & Rubber Co. (Houston) have voted 8 to 6 against continuing the International Union of Operating Engineers Local 347 as their bargaining agent. In similar moves:

• NLRB has concluded a hear-



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ing on a petition of laboratory technicians at Neches Butane Products Co. (Port Neches, Tex.) who want to withdraw from OCAW. The petition was filed by 38 employees, who reportedly want their own bargaining unit. If NLRB grants the petition, a new election will be held to determine which union, if any, will represent the lab workers.

• In a certification election held at Ormet Corp.'s (Burnside, La.) alumina plant, the vote was eight for no union and eight for United Steel Workers union to represent 16 analysts and laboratory technicians in the plant's chemical laboratory. USW asked for the election. But based on past practice, the tie vote means that NLRB will probably rule in favor of no union for these workers.

• Employees of Pennsalt Chemicals Corp. (Houston) voted 14 to 10 against accepting the Stationary Engineers Local 707 as their bargaining agent.

•

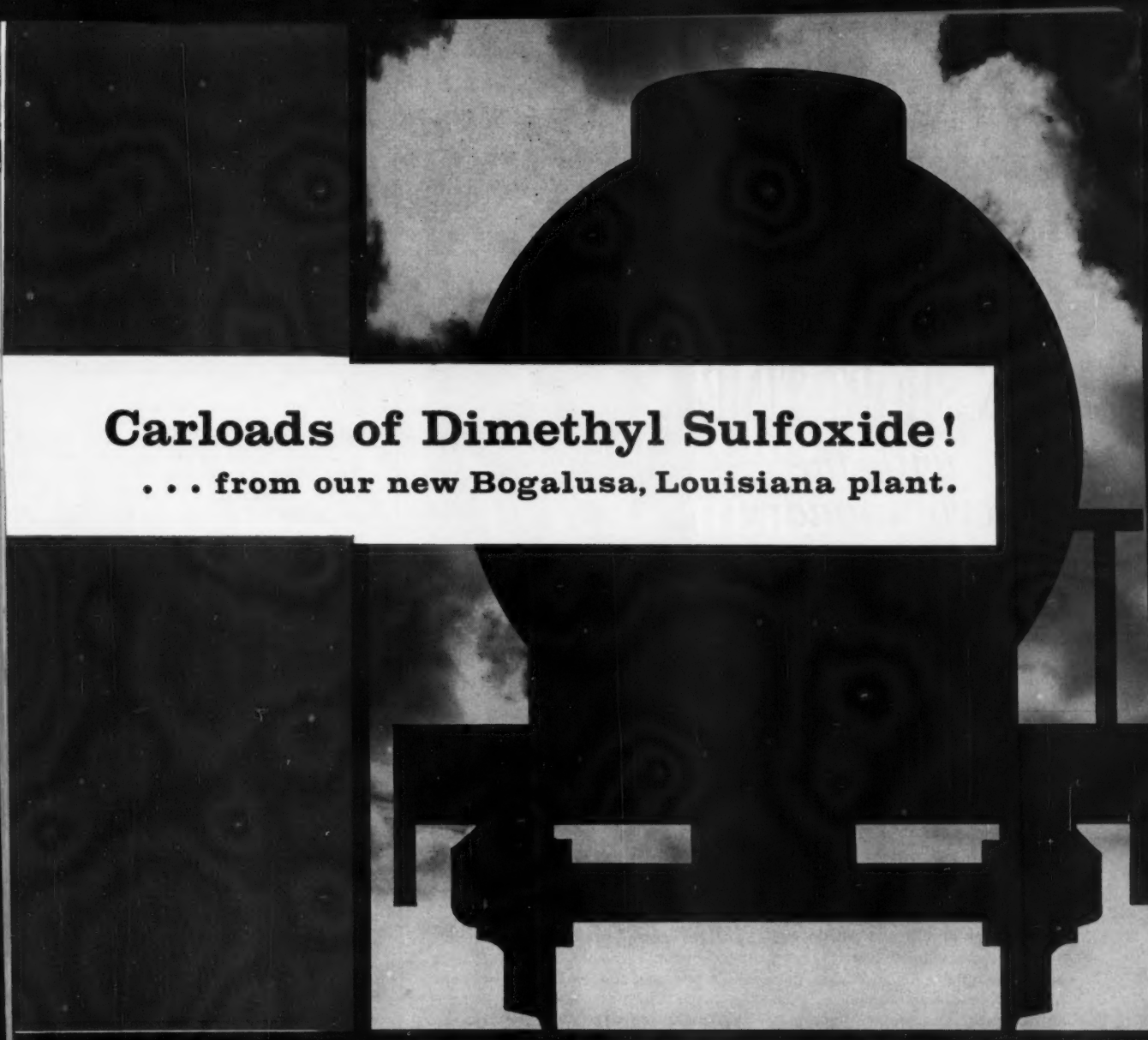
Strike Threat: OCAW Local 11-627 voted to reject what Michigan Alkali Division of Wyandotte Chemicals Corp. (Wyandotte, Mich.) calls its final offer to the workers for a new contract. The vote, 1,100 to 450, authorizes the bargaining committee to call a strike at its discretion upon 72 hours' notice to the company. The old contract expired March 1, but two extensions have been agreed on.

The company says it is willing to grant wage increases ranging from 5 to 9¢/hour and to make upward rate adjustments on nine job classifications. The major stumbling block, according to Wyandotte, is the company's insistence on a no-strike clause, which it claims is included in labor contracts of all its competitors.

•

Durez Ruling: An arbitration board has upheld the Durez Plastics Division of Hooker Chemical Corp. (North Tonawanda, N.Y.) on two issues resulting from a strike by more than 600 employees last November, after which 27 employees were discharged. The strike was held to be a violation of the "no strike" clause in Hooker's contract with Lodge 2112, International Assn. of Machinists.

And a majority of the panel held that the company did not violate its contract by returning three salaried foremen to previously held hourly



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rated jobs without loss of seniority, while certain union members with less seniority were in layoff status. This issue had sparked the three-day walkout. But the board overruled the discharge of 23 of 27 of the fired employees. Twenty-two were given disciplinary suspensions without pay for periods ranging from five to seven months. One employee was ordered reinstated with pay from the date of discharge.

KEY CHANGES

John Ford to director of public relations, American Cyanamid Co. (New York).

J. C. Macon, Jr., to vice-president, Tar Products Division of Koppers Co., Inc. (Pittsburgh).

Fred C. Moore to president, Hancock Chemical Co., subsidiary of Signal Oil and Gas Co. (Los Angeles).

Alfred E. Brown to president, Harris Research Laboratories, Inc. (Washington), subsidiary of The Gillette Co.

Howard F. Reeves and **Anthony B. Ascik** to vice-presidents, Tennessee Products and Chemical Corp. (Nashville, Tenn.), subsidiary of Merritt-Chapman & Scott Corp.

Frederick Bissinger to president, Tyrex Inc. (New York).

Warren A. Beman to vice-president in charge of chemical activities, Union Texas Natural Gas Corp. (Houston).

A. Clark Daugherty to vice-president, Republic Flow Meters Co., subsidiary of Rockwell Manufacturing Co. (Pittsburgh).

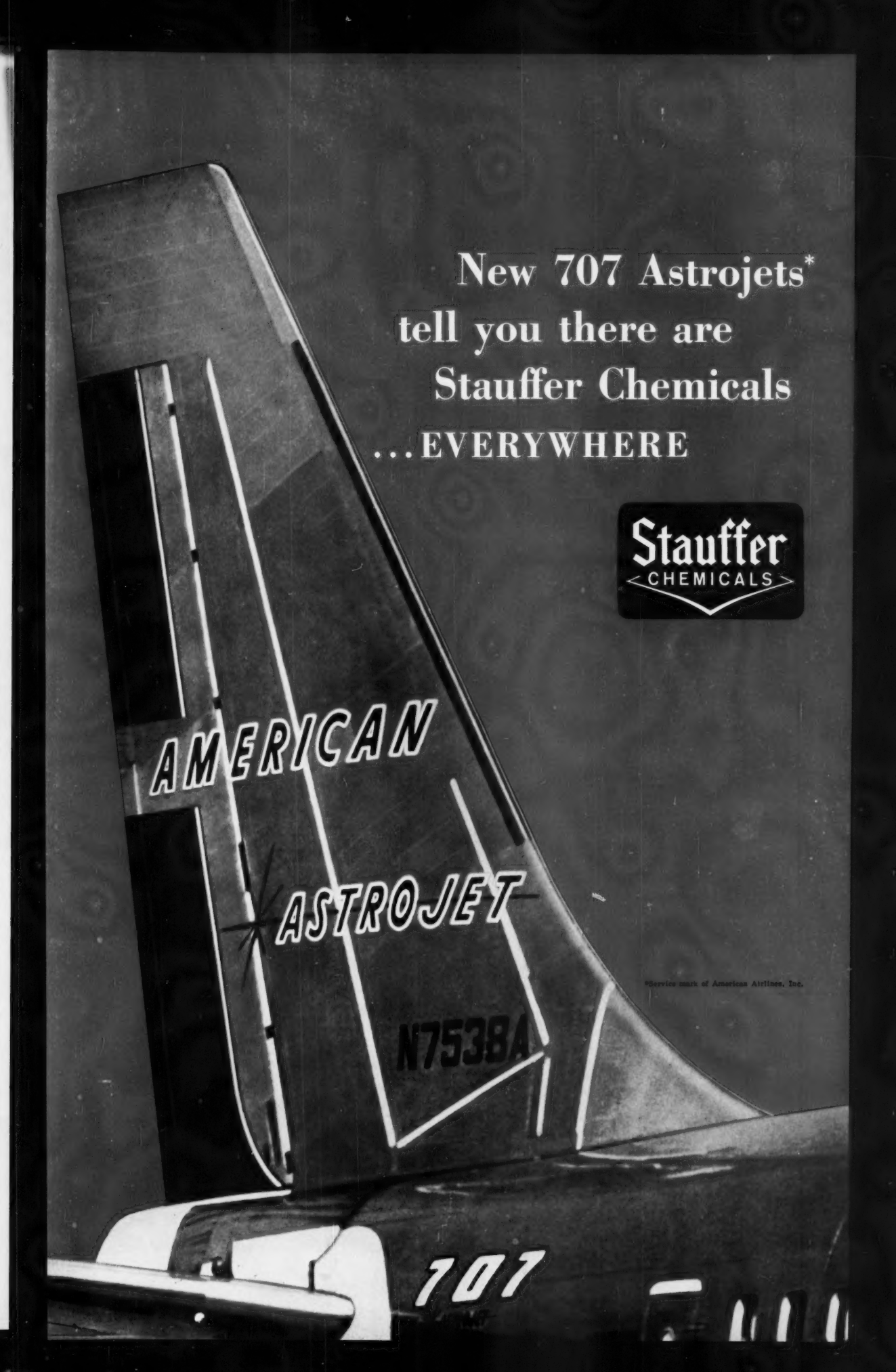
Robert O. Davison to vice-president, algin producer Kelco Co. (Clark, N.J.).

Luther S. Roehm to vice-president for marketing, Merck Chemical Division, Merck & Co., Inc. (Rahway, N.J.).

D. Kenneth Finlayson to vice-president sales; **N. Loring Bowen, Jr.,** to secretary-treasurer, Scientific Design Co. Inc. (New York).

Arthur E. Schmorr to division controller, AIC Chemical Co. (Butler, N.J.).

Ralph C. Read to president, Cenco Instruments Corp. (Chicago).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Chemical Week Report

MAN-MADE FIBERS

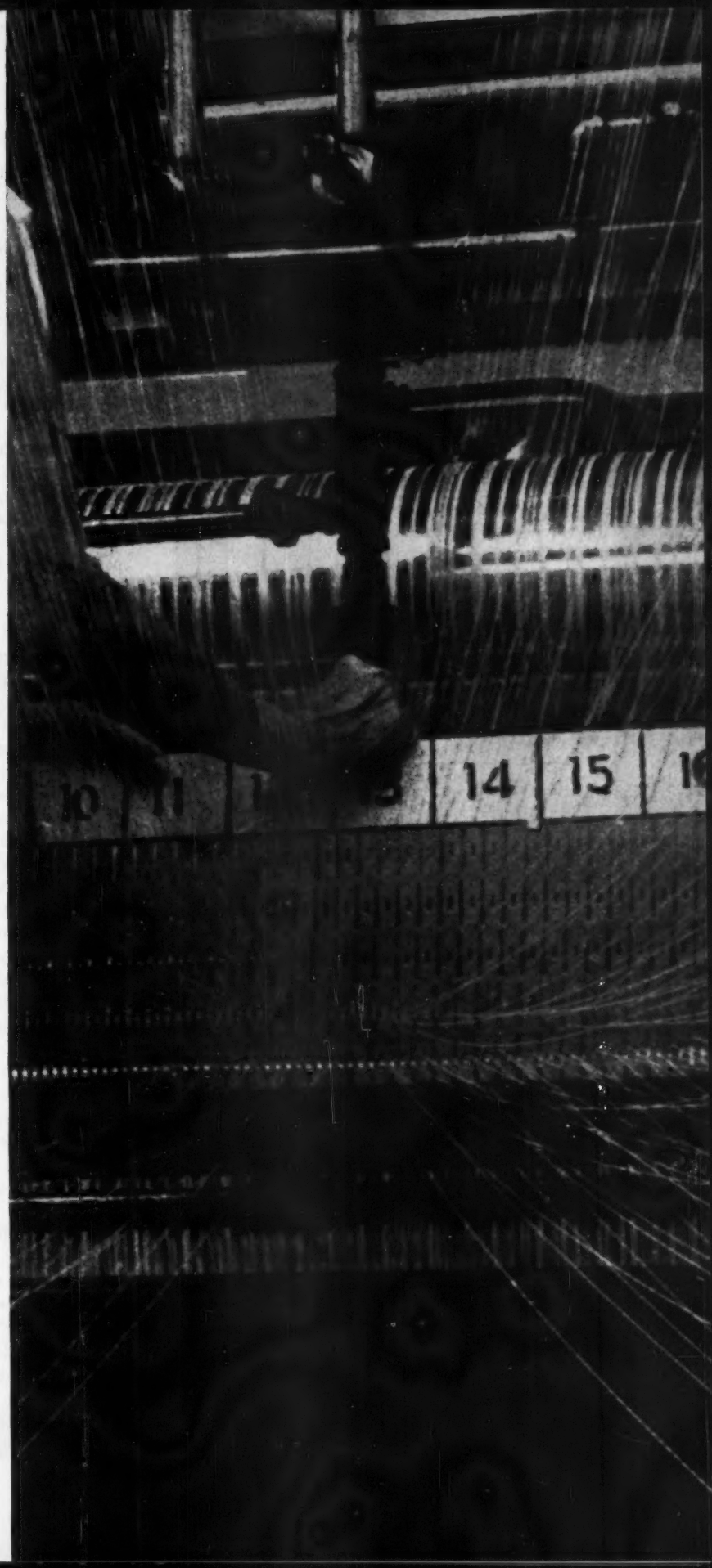
by WALTER H. HINDLE

Fiber makers are facing a challenging new phase.

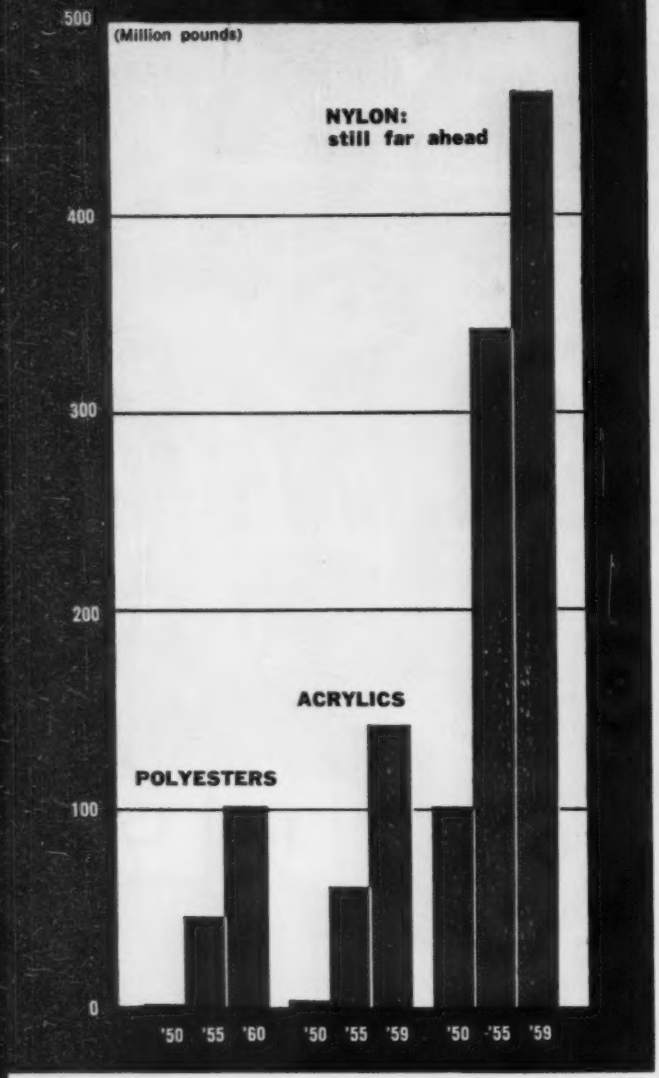
After 10 years of steadily accelerating production of synthetic fibers the chemical industry now finds itself in an unexpected position. While it has wrought an impressive record of technical development and market growth —total consumption of four major fiber types is currently 675 million lbs./year—the cost of this buildup has been far greater than expected and profits from fibers have been generally far less than anticipated.

It is clear that the era marked by nylon's handsome profits is over, but the chemical industry can still look forward to a period of high and steadily growing rate of operation—if it settles for much lower profit than it once envisioned.

Admittedly, it was the hope of rapid profit that first turned the attention of chemical management



Estimated Synthetic Fiber Production



Most makers of commercial fibers and those planning to launch new ones have abandoned ideas of easy profits. But they do expect giant and growing markets for their products — and profits that are at least substantial.

toward synthetic fibers. Nylon's profitability was so dazzling it obscured the special circumstances that made nylon such a money-maker. Result: many companies have been disappointed with the profit records of their own fibers—in fact nylon's record has been approached lately only by the glass fibers.

The last 10 years have taught the chemical industry many lessons about the textile fiber business. Chemical producers have learned that they must virtually enter the textile business; that they must do a first-rate job of educating both the textile operators and the retail consumers about their products. They have found that doing these things can sap profits staggeringly. But having learned these costly lessons, the chemical industry now can begin the phase of consolidating and building upon its hard-won gains.

World population will rapidly increase; "sheep-to-people" ratios will decline to diminish per-capita availability of wool; cotton crops will remain unpredictable; and worldwide shortages of land suitable for growing fiber crops will persist. Meanwhile increasing standards of living will create greater demands for fiber products —especially those made from synthetics. The combination of these situations is encouraging to fiber makers, but the growth—and return—keyed to them aren't the sort that heartens chemical producers.

Moreover, the projected growth probably cannot be achieved unless producers fully accept a profit premise closer to norms of the textile industry. Otherwise, there seems little chance of hoisting demand beyond capacity of plants now operating or soon to be in place.

Changing Patterns: The history of rayon fibers—precursors of today's true synthetics—holds many lessons for makers of the newer products. Rayon output increased 10-fold—from 125 million lbs. to 1.25 billion lbs./year—in the 1930-50 period. Since '50, however, rayon output has been fairly constant at the latter level, held there by the manufacturers' readiness to undertake massive reorientation of product types and to accept ever-decreasing prices. Markets have changed: filament rayon production for apparel uses radically decreased; in industrial types, it increased.

Such fiber "customizing," the chemical industry now knows, is vital to the winning of new markets. It has already begun to modify its newer fiber crop. Although such fibers are indeed versatile, there still remains the profit-eating job of competitively promoting these fibers for new jobs.

It should be emphasized that the "miracle fiber" era has long been buried by the public. New fibers, as good as they are, are not so perfect that they sell themselves. Each new fiber, each new use, requires re-education of textile mill customers.

Thus, while production of true synthetic fibers—chiefly nylon, polyesters and polyacrylics—increased from 38 million lbs. in '45 to 675 million lbs. in '60, it

has been low profit growth for all but nylon. The latter's profitability largely accounts for its dominance among the synthetics; its production is roughly 430 million lbs.; acrylic and modified acrylic output is about 140 million lbs.; that of polyesters, about 100 million lbs.

(Output of glass fibers—not included in the above total—climbed fast from a standing start in '50 to 185 million lbs. in '60. Because uses of glass fibers are largely industrial, the growth came without the cost and fanfare characteristic of more glamorous apparel-directed fibers.)

SYNTHETIC COMPETITION

Although current demand still isn't overstraining fiber makers, additional U.S. fiber manufacturing plants are scheduled for operation by Dec. '62.

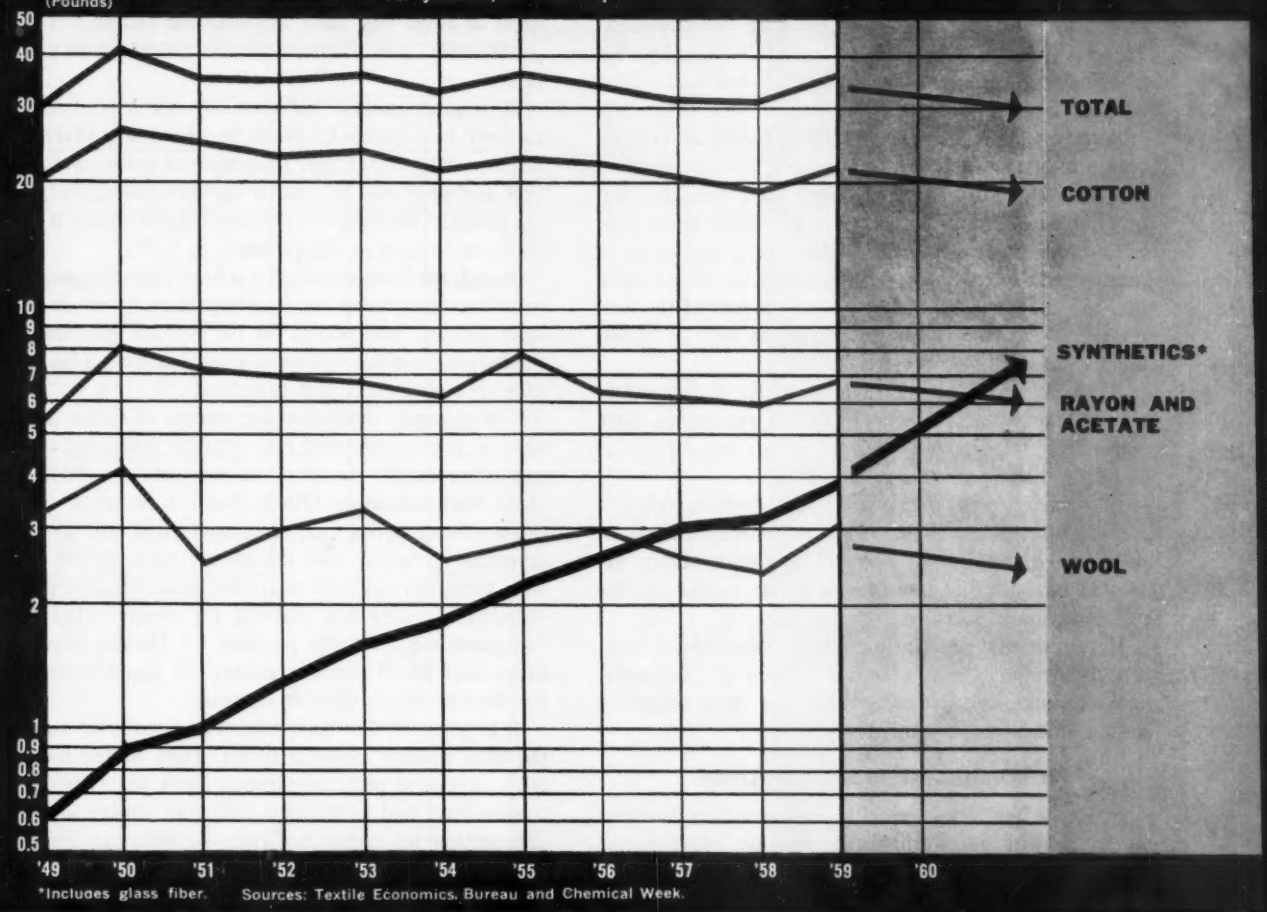
Under present over-all merchandising policies, only nylon shows any likelihood of selling at its projected capacity level. But even in the case of nylon greatly increased demand may well be specific in certain end-use areas such as home furnishings and tire cord.

The current hot battle between nylon and rayon for tire-cord markets—which rayon initially won from cotton—illustrates the growing competition among fiber makers for the same markets. In this case, nylon is gaining rapidly, but a property improvement in rayon could cause a reversal of the trend, since the price-property relationship is a key one to auto tire makers.

But nylon has its competition too. Excess polyester capacity could radically challenge its dominant position in a wide range of end-uses. Filament polyester never competed with filament nylon (while Du Pont controlled both fibers) except in curtains, and then only after nylon failed due to poor resistance to sunlight. But polyester manufacturers having no nylon fiber (e.g.,

U.S. Per-Capita Fiber Consumption

For synthetics, the trend is up



*Includes glass fiber. Sources: Textile Economics Bureau and Chemical Week.

Celanese or Tennessee Eastman) definitely will be after filament nylon's markets. Equally important is the competition of textured filament nylon with acrylics in such applications as knit goods and carpets.

Obviously the manufacturer of man-made fibers must look in many directions to anticipate competition—at natural fibers, at established but different synthetics of other producers, and not the least at fibers newly emerging from research.

Prices Tumble: Underscoring the power of lowered price in the fiber field, it can be pointed out that selling prices of the individual synthetic fibers have dropped steadily—often sharply—since their introduction. Acrylic staple, for example, first sold ('53) for $1.85; it now goes for $1.16—and in one form at 84¢/lb. Prices of nylon tire types and industrial deniers have dropped from $1.49 to 92¢/lb. in the past five years. Polyester staple can now be purchased for $1/lb., compared with $1.60 six years ago.

Despite these reductions, many textile manufacturers believe that synthetic fibers are still overpriced. They feel there will be an eventual leveling out of established synthetic staples at about 70-80¢/lb.

Their appetites for lower prices have been whetted by cheap fiber imports and domestic "unidentified" generics (which are frequently labeled "off quality" but nonetheless perform satisfactorily in some uses—e.g., acrylics in liner fabrics).

Some chemical makers resentfully blame an envious textile industry for trying to condition them to the low rate of return that textile people must tolerate. But textile men point out that when a drastically lower fiber selling price assures a fiber producer of a specific large market, the lower price is established. It seems clear that the chemical fiber makers—now a part of the textile field—must be willing to accept the facts of textile life.

All in all, the synthetic segment of the textile industry isn't unattractive: while over-all per-capita fiber consumption shows a downward trend, per-capita demand for true synthetics is increasing.

In terms of effective utilization, however, this increased use of synthetics is more substantial than poundage data suggest. Reason: synthetics confer increased strength and bulk, hence fabric weight can be reduced without sacrifice of performance.

But synthetics' superiority contains the seeds of trouble: as synthetics win a bigger portion of per-capita fiber consumption, the competition for these relatively static markets grows grimmer.

UNAVOIDABLE RESPONSIBILITIES

Inextricably intertwined in the chemical fiber business are needs for extraordinary promotion, advertising, merchandising and technical service.

The chemical industry itself largely brought about the soberingly rapid rise and fall of the "miracle fiber" era.

Many of the first application results were poor, frequently because not enough was known about the incompletely developed fibers. Consequently the textile industry, in essence, decided to let the fiber manufacturers carry the burden of technical and market development, and then the illusion that "miracle fibers" would sell themselves soon died.

The chemical industry picked up the challenge. During the past 10 years, at fantastic cost, it has entered into all phases of the arts and crafts of the textile industry, an industry that has only recently begun to think in terms of engineering and scientific principles.

That the chemical fiber industry has been successful in textile technology and marketing is apparent from sales growth. But an estimated $40 million was spent on media advertising alone in '60.

This is only one of the factors that have, in most cases, increased the costs of establishing a new fiber (advertising, promotion, merchandising, applications development and technical service) above per-pound costs of fiber monomer.

It is now an accepted presupposition that newcomers must in effect buy their way into the business. This is particularly true of some textile manufacturing concerns.

It is conventional for them to ask a fiber manufacturer how much he plans to spend for advertising before asking about fiber properties or price; cynics say that any fiber can be sold if the advertising budget is big enough. While this is obviously a distortion, it illustrates the nature of the problem.

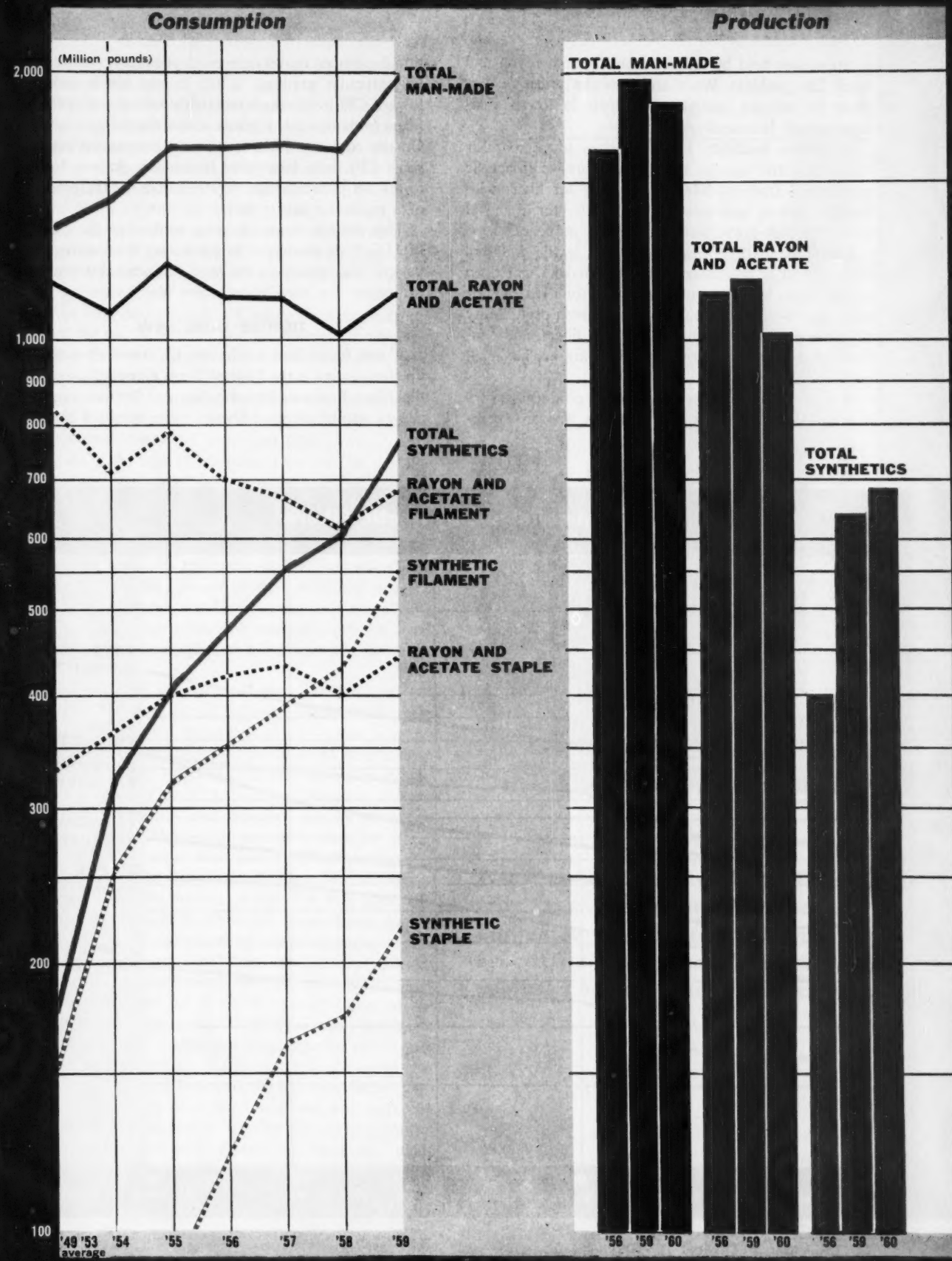
Rough for Newcomers: It has been difficult enough to establish acceptance for a synthetic fiber *per se* and, subsequently, tradenames for the various generics. But the future producer will have a rougher time if he seeks only to match these past practices.

For example, consumer acceptance of Orlon acrylic fiber as sweater material has virtually precluded use of any other acrylic—even if the product were 90% the same composition as Orlon. From a technical standpoint other acrylics can, of course, yield equally good consumer products. But the money spent by Du Pont over these development years has established Orlon as virtually a commodity material for sweaters. Du Pont has promoted a similar position for Dacron polyester in worsted-blend summer suiting, as has Chemstrand for Acrilan acrylic fiber in carpets.

It is probable that such hard-won popularity was not the fiber makers' original intent. They settled for this long, expensive program through sheer necessity. Latecomers have had to find new outlets or engage in costly competition for established ones—a situation that will likely end as fiber's "next phase" begins.

Cost Limitations: New market potentials lie mainly

U.S. Man-Made Fibers



Sources: Textile Economics Bureau and Chemical Week.

in areas now held by less-expensive cotton, rayon and wool. The problem: When and how can prices of new fibers be reduced enough to compete in lower-price-bracket and broader-based end-uses?

A certain flexibility in fiber prices to accomplish this competitive end has been seen before—e.g., acrylic costs range from an 84¢/lb. list price for fibers with woolen system end-uses, to $1.45/lb. for material slated for high-grade worsted spinning purposes.

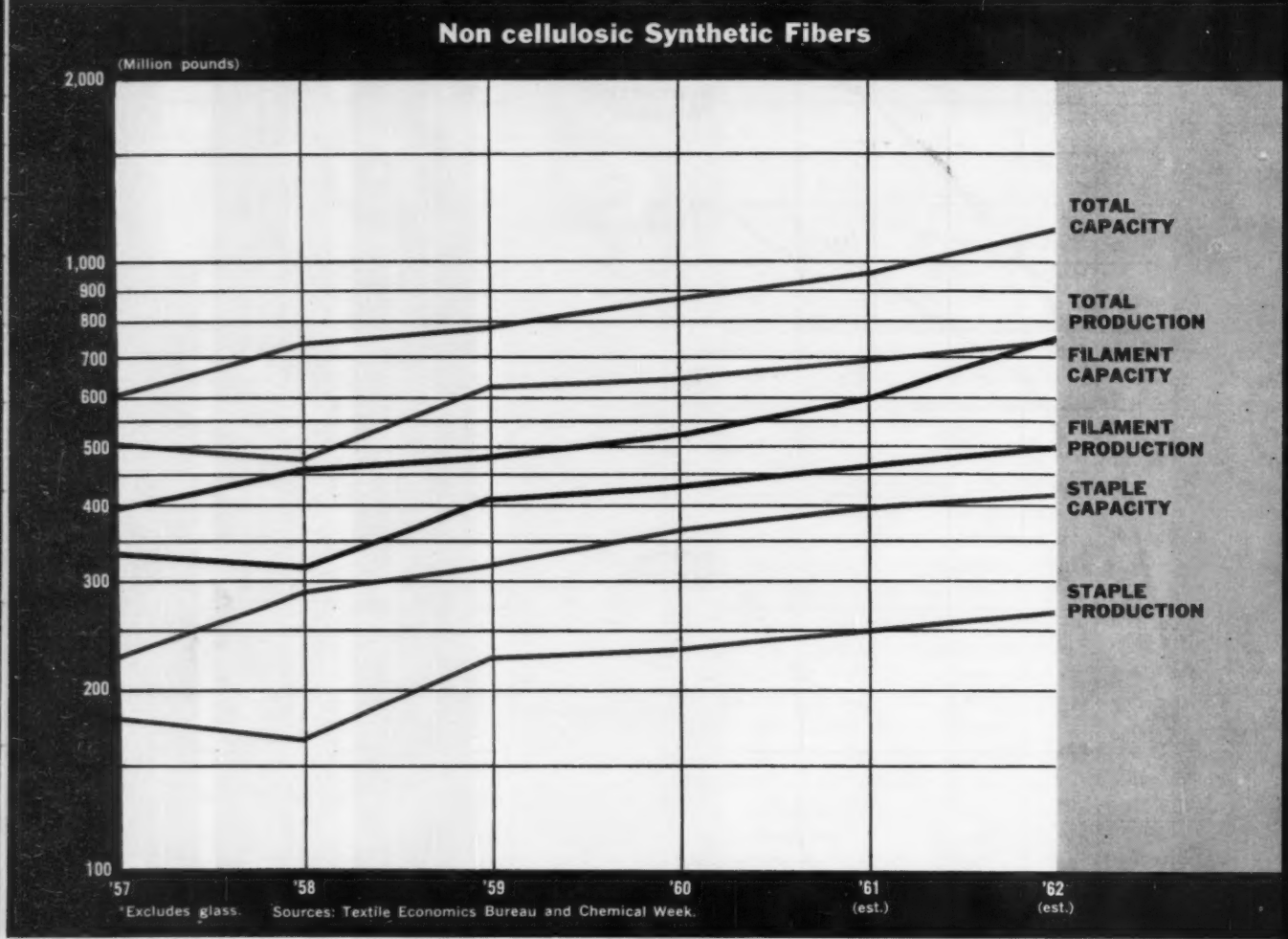
Chemical makers now know that textile industry management is convinced that fiber makers can drop prices. True, textile people have the wrong reasons for such beliefs—they associate the undoubted profitability of nylon production with that of other fibers, and conclude that there's a margin for trimming profits in all cases.

It is probably hopeless for chemical producers to try to convince textile makers that nylon was an exceptional case; moreover, chemical producers realize that no particular gratitude is felt by the textile industry toward CPI producers who established uses of synthetic fibers (although this job was almost forced upon them). On the contrary, there is growing resentment because some CPI firms have tried to convert clothing buyers to ask for particular fibers rather than for the products of a particular textile mill.

This attitude bears eloquent witness to the success of U.S. fiber producers in promoting their own products; it also points to the need for a breakthrough in techniques for introducing a new fiber.

TIGHTER LABEL LAW

A new factor that is affecting the future of synthetic fiber marketing is the Federal Trade Commission's Textile Fiber Products Identification Act," which requires generic identification of fibers used in nonwool apparel.



The general identification must be as prominent as the tradename on labels.

For now, compulsory identification of a fiber's generic name together with its tradename appears advantageous to producers with established product names. But some observers argue that in the long run—especially in new uses—the generic term will remain in the consumer's mind at the expense of the trade term.

For example, there are now four domestic tradenames for polyester (Dacron, Kodel, Vycron and Fortrel); but on garment labels the only fiber description in common is "polyester."

The long-range question: Could a fiber producer convince the textile industry and the ultimate consumer of the claimed superiorities of a certain new fiber when chemically it is essentially the same material as an item already on the market? The job would be especially tough if the product costs more than similar, unpromoted and unserviced lower-cost fibers.

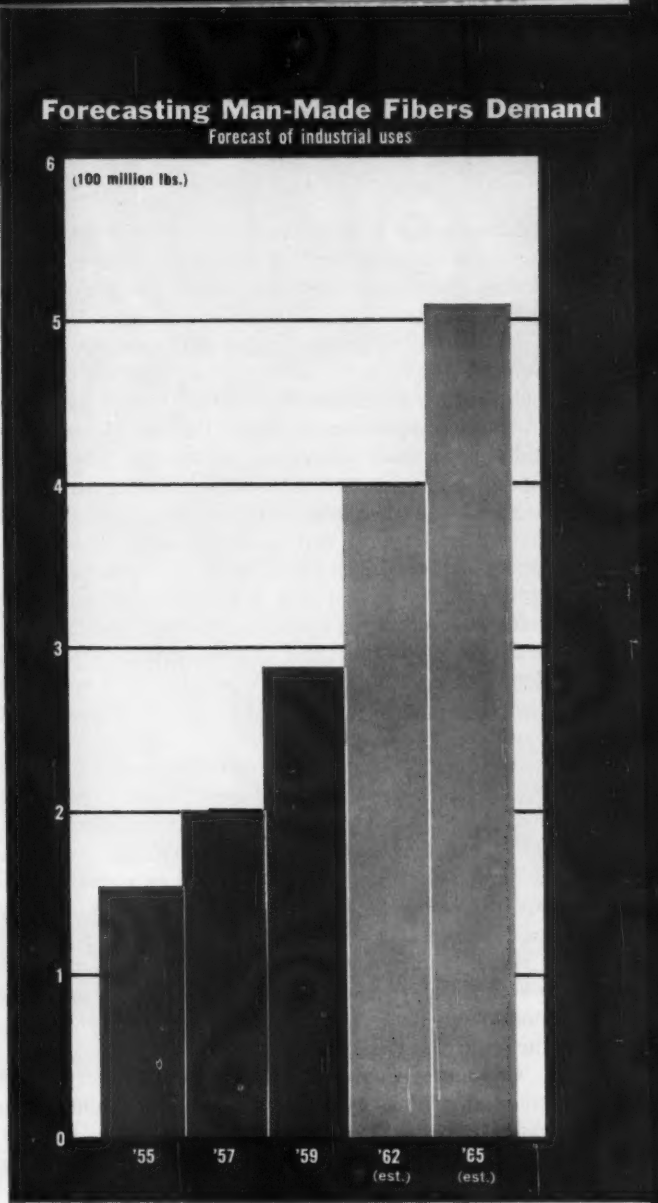
Even if the new fiber's price were low, its reception by textile men would likely be cool. Case in point: the drastic price reductions on Vycron polyester fiber posted last fall by Beaunit Mills (3-denier and 1½-denier Vycron tabs were reduced from $1.36 and $1.26, respectively, to $1/lb. for each) created a sensation in the industry, but this did not shake established prices of Du Pont, Celanese and Eastman versions of polyester fiber, all of which have been sold on a prestige basis. The idea, however, proved most attractive to textile men.

In a published interview (*Modern Textiles*, Dec. '60) Beaunit President Israel Rogosin defended the price cuts by saying that Beaunit sales of Vycron were nowhere near the production capacity of 12 million lbs./-year. Moreover, Rogosin criticized expensive promotional policies of other producers as "wasteful, extravagant and pointless," and indicated that he would not attempt multimillion-dollar promotion that has the effect of forcing other fiber makers to sell below cost. This year should prove—or disprove—the wisdom of his move and the manner in which it was done.

Rayon's Record: As previously pointed out, the history of rayon's attainment of commodity status hints that low price alone won't keep markets; that tailoring a fiber for a special end-use is important too.

There are now 14 different types of Orlon acrylic fiber designed for a wide variety of uses. Some are sold under new tradenames (significantly, prices vary according to end-use). Polyesters, too, are being custom-made for specific uses—even nylon has been modified (at least in cross-section) to attract new markets.

Even before its uses in wearing apparel appeared to reach a saturation point (about two years ago) nylon was being modified to meet other special applications. Aside from special sizes produced for industrial jobs, it was given added stimulus from texturing systems—



There's suspicion now that consumers aren't very perceptive, or, in fact, even interested in the technological advances in fibers—and are increasingly confused by the welter of tradenames.

in conjunction with cross-sectional fiber developments —which minimize the "hot in summer, cold in winter" feeling previously associated with nylon and provide added luster.

Additionally the texturing of heavy deniers has developed a new carpet use for nylon. This will consume an estimated 60 million lbs./year in the next five years.

Unsung Improvements: Again the case of rayon provides some useful guidelines, proves that troubles are not all over once producers decide to offer many fiber versions—and low prices. For one thing, rayon makers have done far more than to simply modify. They have developed new fiber types based on chemical cross-linking and, through new manufacturing technology, have gained greatly improved properties. This has even led some rayon producers to think that the long-range future of rayon lies in development of new types and that U.S. markets for existing types will be abandoned to foreign producers.

The new problem is that rayon producers have not been able to convince the Federal Trade Commission that their new products merit a new generic description. They are thus saddled—perhaps unjustly—with the disfavor inherited by filament rayon as a result of inappropriate usage by the textile industry during the past decade.

What is the way out of this dilemma? This is a case where the only answer seems to be extensive, expensive promotion—but at rayon's selling prices (40-45¢/lb.), the limits to promotion are obvious.

Consumers Confused: The chemical industry has a conception of its own that seems to be as difficult to dislodge as the government's views on rayon: that the ultimate consumer of synthetic fiber products can be made to understand and appreciate the value of technological advances. There's suspicion now, however, that consumers aren't very perceptive or, in fact, even interested.

Some in textile management, as well as apparel retailers, now insist that consumers are primarily interested in cost, style, performance and retailer guarantees. Fiber content is said to be no more important to the consumer than the steel in his car or the bricks in his house. Such things as descriptive hang-tags or labels are ignored. Result: some retailers simply tell their salespeople to do no more than explain to customers that some fabrics are natural, some are "synthetics."

DEPENDABLE MARKETS

Industrial uses for textile fibers (not including apparel and domestics) are not as important targets for advertising and promotional efforts as are retail consumer markets.

In the industrial areas a performance-to-price ratio, which can be measured, is the key point on which acceptance is centered. The industrial market for fibers (throughout this report, the industrial market includes tire cord where applicable) in '59 was 1.3 billion lbs., of which 47% were man-made.

This market is relatively slow to develop because testing periods are likely to be prolonged. Once the markets are established, however, they are far less volatile than apparel markets.

For many years ahead cotton will remain the primary industrial fiber. The man-made fibers have begun to replace cotton in many areas, however, where tenacity and resistance to abrasion and rot can be supplied more cheaply.

But this does not mean that potential synthetic fiber poundage could ever become as large as current industrial cotton markets. Because synthetics are more efficient per pound of material, less than half the present poundage would be required even if all industrial cotton uses were supplanted.

There's another factor that complicates evaluation of the cotton-synthetic competitive picture: the price-property relationship of cotton to synthetics must be considered artificial so long as the price of cotton receives government support.

To single out one particular product, nylon in industrial applications appears destined for the prime position in tire cord. When it takes over the role, it will have absorbed a 280-million-lbs./year market. But the selling price of nylon at that point may be closer to 80¢/lb. than the present 92¢/lb. (it has already dropped, was $1.18/lb. two years ago).

It's reported that 80¢/lb. is the price that will discourage most tire manufacturers from making their own yarn (Firestone, however, is already making some of its own tire cord).

SOME SPECIFIC TARGETS

The 300-million-lbs./year consumption of wool—some of it is sold at about 85¢/lb.—doubtless is the main ultimate target of acrylic manufacturers. Right now, acrylics are 92-97¢/lb. When acrylic prices become more competitive with lower-grade wools, the prognosis for increased acrylic fiber consumption will be more favorable. In this area the acrylics perform outstandingly in terms of wear, washability.

Polyacrylic fibers are now well established in knitwear, carpets, slacks, skirts, liners and blankets. The sweater market (now at 50 million lbs./year) is big, but advancing at a slower pace—if at all—compared with its earlier growth.

The reported sale of 150 million lbs. of polyacrylics in '59 is not likely to be greatly exceeded soon—in fact, it is likely to drop off about 20 million lbs. (mainly in the export area) as more European plants go onstream. This market volume is in striking contrast with current U.S. productive capacity of 260 million lbs./year.

Meanwhile current selling prices—inflated by pro-

Suppose you had to write on birch bark

Birch bark was the best material Indians could find on which to paint their picture-messages. But when modern-day paper manufacturers included bark, birch or otherwise, in making groundwood pulp for paper, printing quality was poor.

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motion costs—preclude any appreciably wider growth pattern. Moreover, acrylic fiber imports are starting to compete with U.S. material in unmerchandised areas.

Polyesters—Building Slowly: Polyesters have established new standards of performance in wearing apparel and have made the major contribution to worldwide popularity of the wash-and-wear concept. Unlike acrylics, polyester staple is seldom used in 100% form but is blended with cotton and with wool in summer-weight and medium-weight goods.

By the end of '61 installed polyester capacity in the U.S. will be 190 million lbs./year. Sales in '60, however, were less than half that amount. The growth rate of polyester consumption now appears to be limited to relatively few end-uses. In this case, too, there will probably be no major pickup until polyester end-products can be placed into lower price brackets.

Polyester filament may be successful in taking over some nylon apparel end-uses on a price-competitive basis. Also, its use in industrial applications is growing and it ranks as a research possibility for tire cord.

Glass Gains: Almost unobserved by the general textile market is glass fiber. Without fanfare or spectacular promotion it has established itself as the fastest-growing fibrous material. Production is now about 180 million lbs./year—double the output in '58.

Except for glass curtains and drapery fabrics, glass-fiber uses have been almost exclusively industrial—largely as supporting material in plastic laminates.

Considering the rate of growth projected for these construction materials, glass, of all fibers, appears to have the highest growth prospects over the next five years. It is, of course, difficult to believe that the present supremacy of glass fiber in the hard-laminates field will remain unchallenged. Polypropylene, with its high modulus and low moisture regain, may be a competitor when the problem of thermal instability is solved.

NONGLAMOR FIBERS AND THE FUTURE

Although polyamides, polyesters, polyacrylics and glass account for the major poundage of synthetic fiber, a number of other generic materials are currently produced in this country.

These include modified acrylics, olefins (chiefly polypropylene), saran and lesser-known fiber types such as nytril, vinyon and spandex.

The future of modified acrylics, staple fibers appears to be limited in growth potential to rather specific end-uses. Their characteristics have proved quite useful in blends with other fibers—particularly in carpets, bath mats, etc. But in general their role is secondary.

A nytril fiber called Darvan is currently under development by Celanese; although it has some properties that may be superior to those of the acrylics, problems of dyeability have confined the material to pilot-plant stage for several years. Last week Celanese abandoned U.S. activity in Darvan, made a manufacturing agreement with Germany's Farbwerke Hoechst.

Saran has gained acceptance in outdoor furniture uses because of ultraviolet resistance and in upholsteries where its flame-retardant properties are valuable. It's expected that saran will never be more than a small-volume material.

Spandex, a fiber with extremely high elastic properties, is produced by both Du Pont (Lycra) and U.S. Rubber (Vyrene). Initially intended for lightweight foundation garments and swim suits, this polyurethane polymer is reported to be basically more difficult to produce than many other synthetics. It's not expected that spandex will be a large-volume fiber, but indications are that it will establish a solid position

Polypropylene Dreams: Polypropylene, as a textile fiber, has probably received more market acclaim than any other synthetic fiber at a comparable state of development. It has been very successful in a number of industrial uses where its main inherent deficiencies are not detrimental.

Polypropylene's most attractive feature is its low long-term cost projection — in the neighborhood of 50-60¢/lb. for staple. Because of its high covering power (it has a specific gravity of 0.9) polypropylene could be the first synthetic to compete heavily with cotton and rayon.

Admittedly major deficiencies still exist in polypropylene (e.g., inadequate dyeability, thermal instability, ultraviolet instability), which preclude its general use. These drawbacks are likely the reason for AviSun's statement last week that it had no immediate plans to produce fiber. But the material has gained rapid acceptance in the rope and filter-fabric fields. And mass-dyed monofilament is already being used in some automotive fabrics. In any case, propylene's low raw-material cost—almost assuring a low selling price—should be sufficient stimulus to the solution of its major problems.

Thirteen firms are already in, or have expressed intention of making, polypropylene resin. Hence, by the time the fiber begins to show commercial success, there will probably be no dearth of resin suppliers. The key point in polypropylene fiber possibilities is that eventual solution of its major technical problems must be accomplished at low cost; the usual nickel-per-pound-per-property improvement would place the new fiber in the cost class of established synthetics.

Today a great deal of money—on an international basis—is being poured into their development in the belief that this can be done. Montecatini, with its mass-coloration technology, appears to be in the lead; but mass pigmentation has limitations, and there is a need for supplementary piece-dyeing technology if the fiber is to win solid acceptance.

Outlook: The near future of fiber production is

reasonably predictable. Those firms with fiber markets established on a prestige basis can be expected to continue operations on essentially present lines, but with little expectation of really rapid growth. There are some that have been trying to hit the "big time" by means of these same tactics. They may continue to do so while patience and funds last. It seems more likely, however, that they will try to establish a new relationship with textile manufacturers. Basis of this, of course, will be a relatively low selling price, devoid of the producers' usual trimmings.

They will also hope to establish the idea that fibers in the same generic group are essentially equivalent in performance. Developing this approach on a full-scale basis will take several years. But the process has already started as is evidenced by marketing of "unidentified" domestic and imported generics.

The commodity-pitched approach to marketing provides the best hope of resumed rapid growth of synthetic fibers in wearing apparel and other domestic uses. This, of course, means lower profit return per pound of fiber sold—one valid reason why established producers will resist the trend.

Pressures from two directions—raw-material producers and many fiber purchasers—may eventually put synthetics into real volume competition with natural fibers. The competition will be further intensified if—as the U.S. Dept. of Commerce predicts—fiber use in clothing will increase only 15% by '70 (although in home furnishings it may increase 45%).

Industrial Boom: In industrial markets, where price, properties and performance are paramount, prospects of continuing growth are considerably more promising. In fact, the golden age for synthetic fibers may lie outside the basically textile field—e.g., in areas where they become building blocks for engineers.

This not only includes those constructional uses now dominated by glass fiber but also potentially embraces wholly new areas of technology. One possibility: the importance of synthetic fibers to the papermaking industry will be enhanced as fibers are developed for specific performance. As papers with more textile-like properties are made from such new materials, the possibility of producing textiles by economical papermaking methods will become feasible.

More Foreign Competition: Synthetic fiber manufacturing has become a huge international business, and the U.S. can no longer realistically regard itself as the only—or even chief—repository of chemical and engineering know-how.

For example, exclusive of any polypropylene developments, Japan's installed fiber capacity will have doubled between early '59 and the end of '61, when total capacity will have reached 380 million lbs./year. In addition to producing fibers made also in other countries, Japan has its own uniquely domestic development: polyvinyl alcohol fibers. Installed capacity for these products will be 120 million lbs. in '61.

The American-inspired Japanese acrylic industry is already grossly overbuilt and is reaching hard for Western markets. Western Europe—source of polyester and polyolefin fiber development—has a steadily growing group of fibers.

This augurs a short history for U.S. synthetic fiber exports. The tide is already turning in the opposite direction. It is difficult to believe that these products can be produced cheaply enough in foreign countries to compete fairly in the U.S. market. But the extent to which they are worked into yarns, fabrics and apparel —using relatively cheap labor—will present an increasing competitive challenge to U.S. producers.

The adverse shift in fiber import/export balance will, in the next decade, add to many other problems faced by U.S. synthetic fiber producers.

These factors, viewed by a chemical industry seeking only very high-profit enterprises, could be discouraging. But U.S. industry has always been adaptable, and the still clearly sighted vision of a giant volume market will be enough to keep chemical makers spinning their fibers. The first synthetic fiber phase is unmistakably over; the industry must now ready its new approach to the next, and potentially bigger, one.

CW PHOTO—MORT SCHREIBER

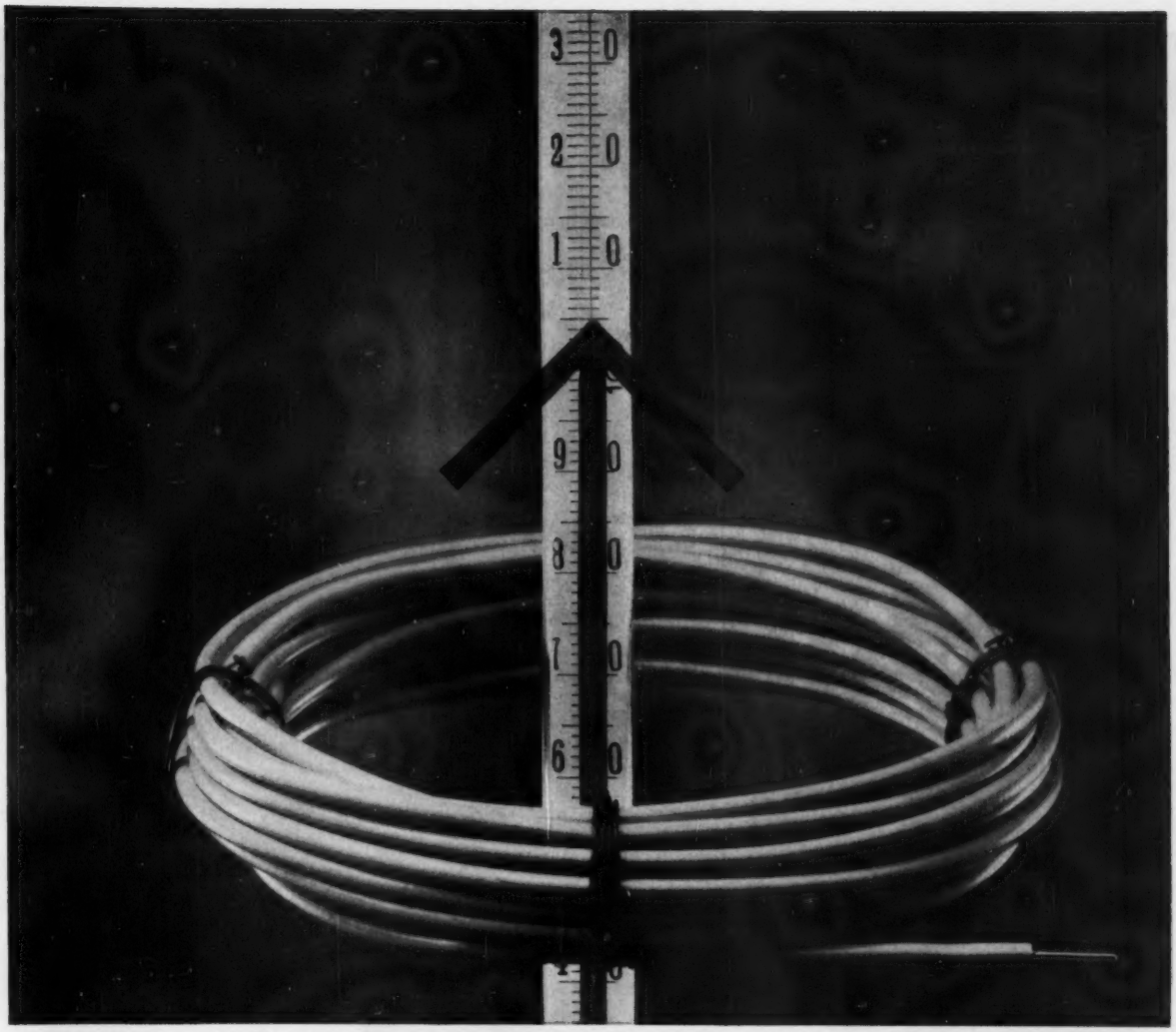
MEET THE AUTHOR

Walter H. Hindle brings international experience in the fiber industry to his position as head of his own consulting firm in the fiber development field, Walter H. Hindle, Inc. Prior to forming his own firm, Hindle was associate director of research and development—also director of applications research—for Chemstrand Corp. Before that, he worked in fiber development with Celanese Corp. and with Burlington Industries.

Born in England and trained in the arts and sciences of fiber technology at Manchester College of Science and Technology, Hindle has worked for 20 years in the U.S. and has visited fiber producers in all parts of Europe and the Far East.

Through his travels, lectures, publications and patents, Hindle has gained an international reputation as well as experience in fibers. He recently was awarded a coveted Fellowship in Britain's Society of Dyers and Colourists; he is also a Fellow of the Textile Institute.

Copies of this report will be available at $1 each from CW Reprint Dept.



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Allied Chemical's recommended procedures for incorporation of "Elastex" 26-P in high temperature wire assure you of optimum working characteristics, reduced costs and elimination of more expensive materials.

The following chart indicates performance:

ACCELERATED AGING, 7 DAYS AT 136°C	UL Spec. Subject 758 Min.	DDP	Polymeric	26-P
Retained Tensile Strength, %	65	250	93	108
Retained Elongation, %	65	0	98	90
Volatility, % wt. loss	—	17.1	2.2	6.0

Allied Chemical is glad to assist in improving your products with "Elastex" 26-P Plasticizer or the many other Allied Chemical Plasticizers. Call our representative or write us direct for samples and technical data.

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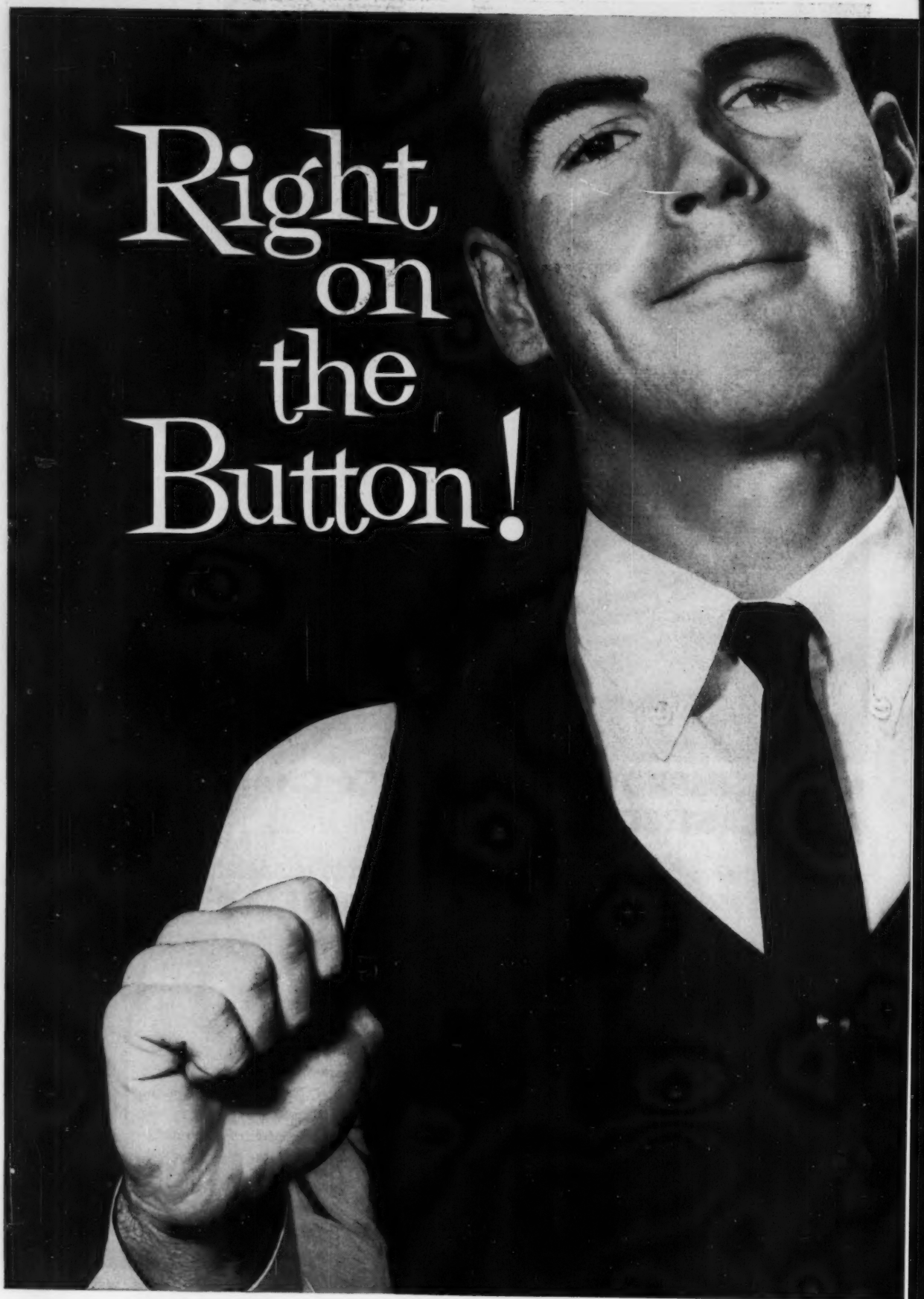
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ESSO STANDARD, DIVISION OF
HUMBLE OIL & REFINING COMPANY

Technology
Newsletter

CHEMICAL WEEK
April 15, 1961

Two new ethylene copolymers that may well be one and the same were introduced last week by Dow Chemical Co. and Union Carbide Plastics Co. Dow's product is a copolymer of ethylene and ethyl acrylate that has end-use characteristics similar to the flexible vinyls (*CW Technology Newsletter, March 25*). The new material, called Zetafin, is said to have processing advantages over flexible vinyls, including less rigid temperature control and elimination of compounding (except for colors). Price: 32½¢/lb.

Carbide's entry, Bakelite DPDB-6169, also sells for 32½¢/lb. but is described only as "a unique ethylene copolymer" that "can be regarded as a completely new material rather than a modified polyethylene." It is said to combine the stress-crack resistance of vinyl, the flex-crack resistance of rubber and the resiliency and elongation of polyethylene.

Dow has applied for patent coverage of its material, but none has yet issued. Carbide holds two related U.S. patents—2,953,541 and 2,953,551—that cover a composition of polyethylene mixed with a copolymer of ethylene and ethyl acrylate and a process for making copolymers of ethylene and alkyl acrylates. But Carbide's coverage of the ethylene-ethyl acrylate copolymer composition is not evident. Possible upshot: an eventual cross-licensing agreement.

•

Allis-Chalmers will reblade the coal-fired gas turbine being developed by the Bureau of Mines at Morgantown, W. V. A-C was low bidder—$212,968—for installing some 600 new blades in the 3,750-hp. experimental model. (The other bidder on the project was General Electric —$273,000.) A high-temperature alloy steel will be used.

The coal turbine has created excitement for some time as a possible source of power for a variety of chemical process and other applications. The most formidable problem in developing it is to find a blade that will stand up to the required high temperature and the erosive atmospheres. The unit being studied by the bureau is on loan from Bituminous Coal Research Institute.

A number of groups have worked on the problem. The Germans now are working on an expendable approach. Blades are shrunkfit on a shaft and discarded after several hundred hours of operation. This is considered too costly in this country, however.

•

Two new developments on polyethylene film:

• The same performance from less film is what Monsanto is saying about its new general-purpose polyethylene film with a 40% increase in impact strength. The new resin, MPE 706X and X/, can be put through extruders at the same rate as conventional ones, but it requires a higher

temperature (by 10-15 F). It's suitable for 1-12-mil-thick films, is available in no-slip, medium- and high-slip versions.

• Olin Mathieson's polyethylene film featuring a coating (unidentified) on both sides is now available on a limited basis from a pilot plant. The double coat, says Olin, makes for increased resistance to passage of oils, greases and flavors.

•

An added push for magnetohydrodynamic (MHD) research came last week in the form of a $298,410 contract awarded to Avco-Everett Research Laboratory by the Air Force Office of Scientific Research. Studies will include the behavior of a magnetic field in a plasma, radiation emitted by the plasma and its electrical conductivity. Avco has been involved in MHD research for over five years, particularly for use in power generation (*CW, Feb. 25, p. 92*).

•

A fuel cell operating on natural gas for home use will be the target of a new joint program of Houdry Process Corp. and Northern Natural Gas Co. (Omaha). Houdry will carry on the work, mostly on development of a suitable catalyst, at its Linwood, Pa., labs.

•

A new family of "graft" celluloses is planned by Rayonier Inc. First entry is Ethylose, a low-substitution (4%), water-insoluble hydroxyethyl cellulose for use in textile sizes, binders and coatings. Potential markets: coated papers, paints, ceramics and foods. The new product is stable in pellet form (unlike viscose) and can be conveniently handled in dilute alkali solution. Price: 50¢/lb. in 50-lb. bags.

Borrowing terminology from the plastics industry, some cellulose makers refer to modified celluloses as "graft" materials—polymer chains with other chemicals "grafted" on as side chains. In this case, ethylene oxide reacts with a small percentage of the hydroxyl groups in the cellulose to produce hydroxyethyl side chains. An undisclosed new process (on which patents have been applied for) is the key to the low degree of substitution, toward which the company has been working for several years.

•

The hydrogen source for Linde's big new liquid hydrogen plant at Fontana, Calif., will be methane. The firm is not talking about it now, but Chemico is believed to have a letter to intent for a steam reformation unit.

Linde had been negotiating with Kaiser Steel for purchase of coke-oven gas for hydrogen. If it had gone through, Linde would have become the third U.S. company to employ coke-oven gas for hydrogen. The other two: U.S. Steel and Alabama By-Products, both of which use it for ammonia production. But apparently the two could not reach an agreement on long-term sales contract and disposal of other products after hydrogen removal.

CHEMICALS OUTLOOK

April, 1961

This bulletin is published to keep you posted on Wyandotte Key Chemicals, their applications, and the many services Wyandotte offers. You may want to route this to interested members of your organization. Additional information and trial quantities of Wyandotte Key Chemicals are available upon request . . . may we serve you?

CALCIUM CARBONATE AS AN ALKALINE PAPER FILLING

A study recently conducted by the State of Virginia Library sheds some new light on the use of calcium carbonate as a paper filler and as an alkaline buffering material. The study shows that papers manufactured at an alkaline pH level and incorporating calcium carbonate as one of the fillers can successfully withstand the harmful effects of long-term aging.

The calcium carbonate, while acting as a paper filler, also serves as a buffer, thus maintaining an alkaline pH. This physical property is of particular interest to paper mills producing book, bond, and writing papers.

The filling of the paper fiber network with calcium carbonate enhances both the optical and printing properties of the final sheet. Other properties of the sheet which may be controlled include softness, caliper, and ink penetration.

Purecal® O, Wyandotte's precipitated calcium carbonate, is especially effective in this application when additional whiteness and brightness are desired. We have prepared a data sheet based on this study . . . write for your copy on your company letterhead.

ETHYLENE OXIDE, PROPYLENE OXIDE IN 20,000-GALLON TANK CARS

Wyandotte has recently acquired a new fleet of 20,000-gallon tank cars, suitable for shipping ethylene oxide and propylene oxide. These shipments are available from both our Wyandotte, Michigan and Geismar, Louisiana plant locations, and can be sent throughout the continental United States.

The new tank cars are compact — only 60 feet long and 15 feet high (outside dimensions). They are heavily insulated to maintain the oxides at optimum temperatures, and to permit close control of pressures.

Large buyers of these chemicals who are now using smaller tank cars may be able to effect appreciable savings by handling fewer cars. We'll be happy to talk over the possibilities with you.

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FLUIDICS* AT WORK

At Jefferson Chemical Company, Inc., Austin, Texas, a 12" I.D. Pfaudler Wiped Film Evaporator distills heat-sensitive organics at an overhead rate of 500 lbs. per hr.

HEAT-SENSITIVE ORGANICS NO PROBLEM with this Wiped Film Evaporator

Jefferson Chemical distills heat-sensitive, high-boiling organics in it with yields of 42 lbs. per hr. per sq. ft. of heat transfer area.

They operate their Pfaudler® Wiped Film Evaporator at 2mm Hg and report unit is simple to clean and maintain. "Actually the over-all performance of this evaporator is superior to any expectations we had," states Jefferson Chemical.

Mechanical wiping. A *true* wiped-surface evaporator, it uses centrifugal force to hold four free-floating wipers in contact with the internal heated wall. Slots in the wipers *prevent* curl and spread product in a thin, uniform film to assure full use of heat transfer area.

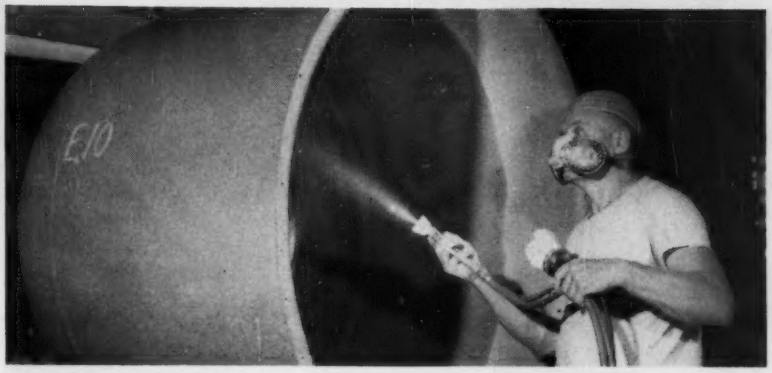
This construction also makes the Pfaudler unit well suited to handling products that are highly viscous or low in thermal conductivity.

Internal condenser. The "U"-tube bundle is *inside*, so there's a negligible pressure drop between evaporating and condensing surfaces. With an internal condenser, you also need less floor space and save on ductwork, piping and installation costs.

Functional simplicity. There's no bottom bearing in any Pfaudler evaporator, so you don't worry about trouble or maintenance. With some products you clean by running a solvent through. For visual inspection or more thorough cleaning, just break vacuum and lift drive, top head, and rotor out as a single unit.

Choose from 12" I. D. models (4, 9 or 12 sq. ft. of evaporating area) or 36" I. D. models (30, 50, 75 and 100 sq. ft.). If you need larger sizes, we make them on a custom basis.

Test the performance of *your product* in the Wiped Film Evaporator at the Pfaudler Test Center. Or get more details from Bulletin 991. Write to the address shown on the facing page.



Pfaudlon 301 plastic coating resists most corrosives to 210°F.

Here's an economical way to protect your equipment from the corrosive effects of most acids, alkalies and many solvents at temperatures up to 210°F. (even higher for certain pre-evaluated conditions).

It's Pfaudlon 301,* Pfaudler's recently introduced plastic coating. It is a water suspension of Hercules Penton† that is sprayed on and then fused to the base metal. It provides you with a glossy, nonporous, smooth coating that protects equipment from direct product contact as well as ambient corrosive atmospheres.

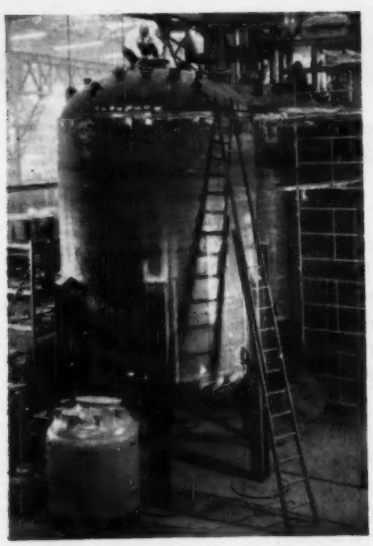
Pfaudlon 301 can be readily applied as an interior or exterior coating to such metals as mild steel, cast iron, stainless steels, Hastelloys, brass, bronze and copper.

It is well suited to protecting a wide variety of equipment – storage tanks, open vessels, pumps and pump parts, agitators and baffles, valves and fume ducts, to name a few.

You can put the corrosion resistance of Pfaudlon 301 to work in two ways: (1) Specify it when ordering new fabricated equipment from Pfaudler; (2) extend the service life of existing equipment by having it custom coated. Ten firms throughout the country are licensed by us to provide this custom coating.

Just issued Bulletin 1007, *PFAUDLON 301 Plastic Coating by Pfaudler*, tells all—what it is, recommended services, how applied, and those licensed to apply it. For your copy, write to the address shown below.

*Patent applied for
†Registered trademark for chlorinated polyether manufactured by Hercules Powder Company.



Very big, in BIG tanks

That's us. Like the 10,000-gallon one you see pictured. Note how it dwarfs the 300-gallon reactor next to it.

This particular tank is of Glasteel construction. It is ideally suited to polymer production, since it protects product purity, resists product build-up, and is corrosion resistant.

This is by no means the biggest tank we've made. One that went out recently for a PVC plant had a 17,000-gallon capacity. And for storage we've gone as big as 35,000 gallons. The point is this: Bigness is a challenge we welcome. We have the skills, know-how and facilities. In fact, right now we're expanding so we can offer you still larger-scale equipment to meet all your future process needs. Inquiries invited. Write to the address indicated.

How to store "problem products" like these at a profit

Storing a fluid that's sticky or corrosive or ultra pure? Then Glasteel storage tanks are your answer.

If your product is sticky, Glasteel (glass inside, steel outside) makes cleaning easy. The product-contact surface is hard and fire-polished smooth, so there's little chance for your product to adhere and build up.

With corrosives, Glasteel ends the constant need for maintenance and replacement. You can safely store all acids (except HF) and most alkalies at ambient temperatures.

If your product is ultra pure, it will not pick up impurities from Glasteel. The glassed interior is essentially inert, won't react with what you put in contact with it. Result? Complete protection for purity, color, aroma and quality.

And the clincher: Glasteel saves you money. In 10,000-gallon sizes and larger the costs are less than for stainless. Regardless of size, with corrosives you save because Glasteel gives you exceptionally long service life (up to 20 years or more) with little or no maintenance.

More facts about sizes and designs? Ask for Bulletin 975.

Please address all inquiries to the Pfaudler Division, Dept. CW-41, Rochester 3, New York.

*FLUIDICS is the Pfaudler Permutit program that integrates knowledge, equipment and experience in solving problems involving fluids.

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Specialists in FLUIDICS...the science of fluid processes

traveling salesmen

Out into the world they go, their appearance carefully planned to give the best impression wherever they are seen. Your drums too, can make as good an impression with custom silk screen imprinting done by Southern States Containers. In a modern, mechanized plant the process of making traveling salesmen out of drums is automatic . . . no delivery problems here!

Under the sparkling exterior, the inside looks just as good. Quality and high manufacturing standards make sure of this. Call collect, write or wire for prices. Your delivery and mechanical requirements will be met, and your drums will take on new importance as they join your sales department.

SOUTHERN STATES CONTAINERS
DIVISION OF REYNOLDS ALUMINUM SUPPLY COMPANY

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Nylons—Old and New

Name	Made from	Status
NYLON-6/6	hexamethylenediamine and adipic acid	commercial for fiber and molding
NYLON-6/10	hexamethylenediamine and sebacic acid	commercial for brush bristles
NYLON-6	caprolactam	commercial for fiber and molding
NYLON-11 (Rilsan)	11-aminoundecanoic acid	commercial for fiber and molding (France's Organico Co.)
NYLON-4	pyrrolidone	developmental at Minnesota Mining & Mfg.; patented by General Aniline & Film and Arnold, Hoffman
NYLON-7	ethyl 7-aminoheptanoate	developmental at Union Carbide Corp. for tire cord
NYLON-7 (Enant or Onanth)	7-aminoheptanoic acid	developmental in Russia for fiber
NYLON-8	caprylactam	developmental in Germany (Badische Anilin- & Soda-Fabrik) for molding
NYLON-9 (Pelargon)	9-aminononanoic acid	developmental in Russia for fiber
POLYOXAMIDES	oxalic acid and diamines	developmental at Imperial Chemical Industries and British Nylon Spinners
HT1	probably *m*- or *p*-phenylenediamine with iso- or terephthalic acid	developmental at Du Pont for high-temperature fibers
MXD6	*m*-xylylenediamine and adipic acid	developmental at California Chemical for fiber, film and molding
	2,4 - bis (aminomethyl) - toluene with adipic acid or 2,4-bis (carboxymethyl) toluene	developmental at Monsanto Canada for fiber
	m-xylylenediamine and adipic acid modified with oxalic acid, *trans* - 1,4 - cyclohexanedicarboxylic acid or *trans*-1,4-cyclohexanebis(methylamine)	developmental at Tennessee Eastman for tire cords and higher-melting polymers
	durene diamines or diacids with aliphatic diacids or diamines	developmental at British Nylon Spinners for fiber

Pushing for Novel Nylons

Union Carbide's recent disclosure of nylon-7 progress (CW Technology Newsletter, April 1) signals a growing interest by a number of firms in developing new polyamides (table, above). Targets are products (fiber, film or molding resin) that can be made from low-cost starting materials or that have improved properties (e.g., melting point, modulus).

In addition to nylon-7 and the existing commercial entries—nylon-6/6, -6/10, -6 and -11 (available abroad)—there's considerable work being done on nylon-4, -8 and -9. And a number of ring-containing materials are getting close study for high-temperature and other special uses.

Commercial Route: Although Carbide says it has no current plans to make nylon-7, it claims that its method is "the first and only economically feasible method for producing nylon-7." The company is interested in talking to other firms that may want to commercialize the material, and it is offering developmental quantities of a basic intermediate, caprolactone. The polymerizable material, ethyl 7-aminoheptanoate, is made from the caprolactone in four steps: hydrochlorination to open the ring, esterification, replacement of the chloride group with cyanide, and hydrogenation of the cyanide.

A key step in the process is heating the ester with water at 100 C prior to polymerizing at 270 C. Without preheating, the ester does not give a satisfactory high polymer; with it, a stable mixture of 7-aminoheptanoic acid, dimeric acid and ester is formed that can either be stored or polymerized immediately into high-molecular-weight nylon-7. Carbide patents on various parts of the process include U.S. 2,839,576 and French 1,210,137, 1,210,181 and 1,210,182.

Nylon-7 (called Enant or Onanth by Russian investigators) has long been known to have properties equal or superior to conventional nylons, but lack of an economic process had held it back. Carbide reports that nylon-7 has a melting point of 225 C (11 degrees higher than that of nylon-6) and a sticking temperature of 220 C (12 degrees higher). Comparison of nylon-7's textile properties with those of nylon-6 and -6/6 shows that it has lower elongation and lower shrinkage in boiling water than either of the other two. Its tenacity and stiffness are higher than nylon-6's, but lower than those of nylon-6/6.

Other Aliphatics: Among other developmental aliphatic polyamides is nylon-8, made in small quantities by Badische Anilin- & Soda-Fabrik AG. from caprylactam. It has particularly low moisture absorption, thus making it attractive for use in molded industrial parts. Melting point and sticking temperature are 185 C and 181 C, respectively.

Even lower moisture regain and higher melting point and sticking temperature (194 C and 190 C) are found in nylon-9, being studied in Russia. The precursor is 9-aminononanoic acid, a by-product of the Russian process for producing nylon-7.

Another aliphatic nylon that's received attention in the past few years is nylon-4, the polymer of 2-pyrrolidone. Both General Aniline & Film and Arnold, Hoffman & Co. have patents in this area. GAF, for instance, holds British patent 850,160 on the polymerization of pyrrolidones and piperidones using organic-substituted halides of group IV elements. And Ahco has U.S. patents 2,638,463 and 2,739,959 on the polymerization of 2-pyrrolidone. Current research on nylon-4 is being carried on by Minne-

sota Mining & Mfg. Co., although the firm says that any move to commercialize the product is distant. Possible advantages of a nylon-4 might be greater heat stability (although processing would likely be a problem) and easier dyeability.

High-Temperature Entries: Attempts to make high-temperature fibers (for use at over 300 C) have included a fair amount of work on polyamides. Du Pont's experimental high-temperature fiber HT1 is described as a "fully aromatic polyamide." Although the company won't identify the composition or even say whether "HT1" describes a single polymer or a family, the best guess is that it is a class including all the combinations of *m*- and *p*-phenylenediamine with iso- and terephthalic acid.

The benzene rings in the chain lend rigidity, while the lack of methylene groups contributes to the thermal resistance. The melting point is understood to be near or above the decomposition temperature, thus necessitating unconventional fiber-forming techniques. Principal application targets are military (airplane tire cord, jet-engine tubing reinforcement), but uses are also envisioned in industrial applications such as V-belts, dust filtration in high-temperature stacks, and electrical insulation.

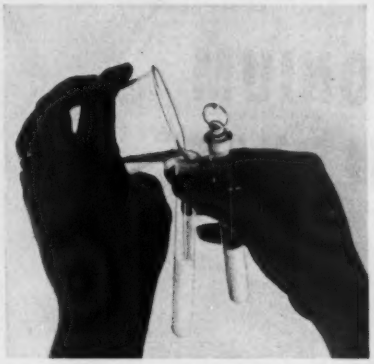
Use of piperazine instead of phenylenediamine would also give a highly stable chain, and Du Pont has several patents in this area. Chemstrand is also working on piperazine polyamides, has an Australian patent application (56,120) on copolyamides of piperazine and adipic acid with nylon-6/6. Presumably the aliphatic portion of the compound would lower the melting point to a more workable level.

Another approach to high-temperature polyamides is the use of oxalic acid (or an oxalate ester) as the acid constituent. The products, called polyoxamides, have no methylene groups in the acid portion of the chain, and have quite high melting points. Processability has been the main problem. Work has been done by Imperial Chemical Industries (e.g., Australian patent application 57,083) and British Nylon Spinners.

Xylylene Approach: Although there's been no commercial result yet, a popular approach to improved poly-

How well does your oil pass the acid test?

Here is a demonstration of the U.S.P. Acid Test for measuring the extent to which a mineral oil has been freed of unsaturated and aromatic hydrocarbons. As you can see, the concentrated sulfuric acid in contact with Sonneborn's fully refined white mineral oil (left) remains clear and colorless. The oil on the right has turned black—typifying the presence of impurities.



With the growing demand for white oils that will consistently meet the high standards required for industry, these and other tests for quality have assumed greater importance. And in the light of industry's increased needs for food grade additives, Sonneborn white oils contribute still another selling feature to your products.

Fully refined from carefully selected raw materials, Sonneborn white oils find extensive application in over 250 different processes and products. These include plastics manufacture, paper impregnation, rolling oils, cosmetic and drug formulations, meat packing and food processing and many imaginative new uses.

Manufacturers and users prefer Sonneborn white oils because of their dependably high purity...good stability to light and heat...chemical inertness and resistance to oxidation and sludging...low volatility...high dielectric properties...lack of color, odor and taste.

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SONNEBORN CHEMICAL AND REFINING CORPORATION
Division of Witco Chemical Company, Inc.
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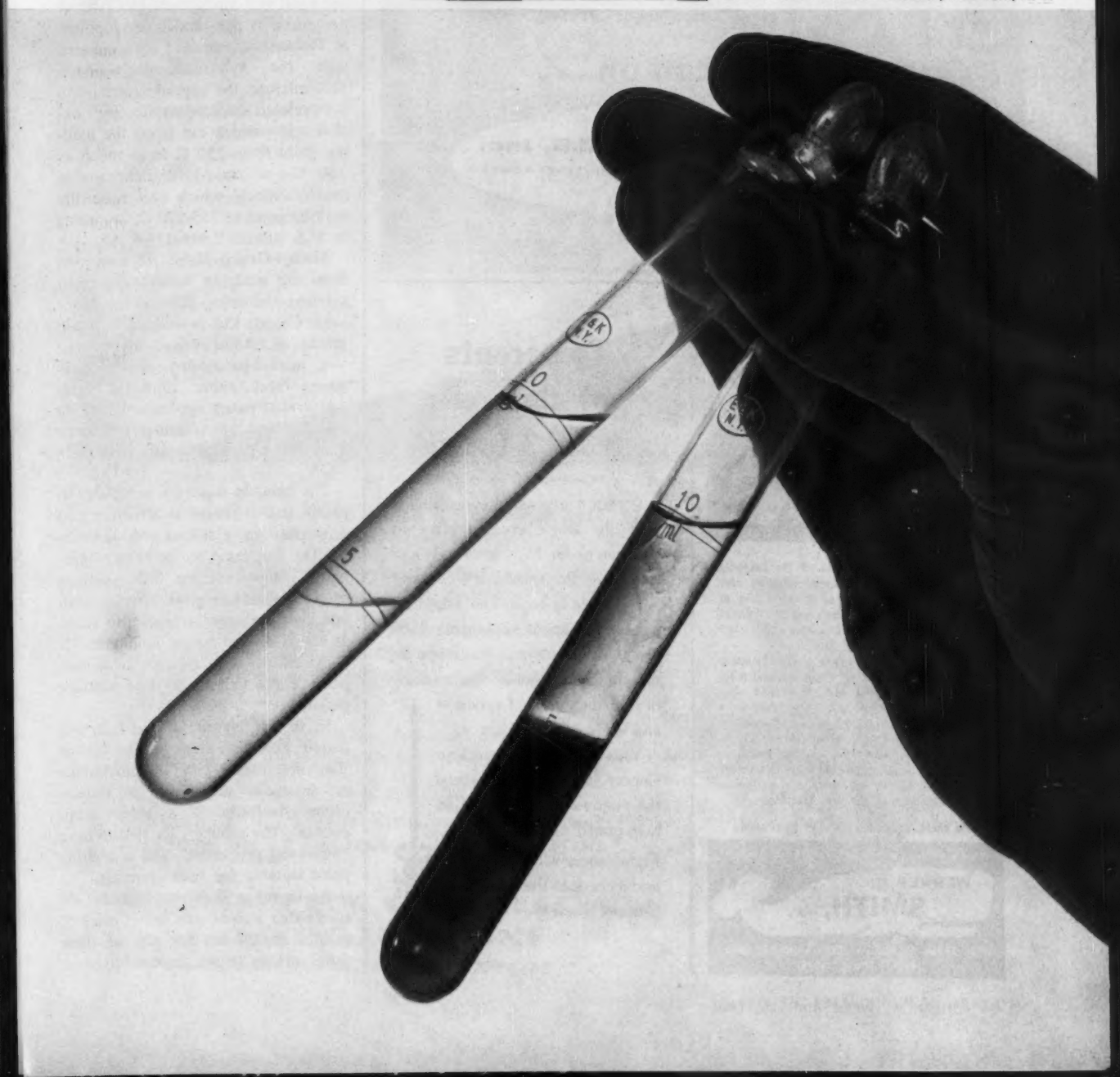

amides has been the use of monomers containing xylylene or methyl-substituted xylylene groups. California Chemical Co. has had such a material in development for six years. Called MXD6, it's a polyamide of *m*-xylylenediamine and adipic acid (covered by California Research Corp.'s U.S. patent 2,766,221).

In U.S. patent 2,766,222, Cal Research describes a clear polyamide plastic made from *m*-xylylenediamine and isophthalic acid (containing as much as 40% terephthalic acid). The plastic softens at 150-170 C and sticks at 210-215 C.

A modification that raises the melting point and modulus of this type of polyamide is now under development at Tennessee Eastman. Copolymerized with the xylylenediamine-aliphatic acid mixture, the upgraders are *trans*-1,4-cyclohexanedicarboxylic (or oxalic) acid—which can boost the melting point from 230 C to as much as 320 C—or *trans*-1,4-cyclohexanebis-(methylamine)—which can raise the melting point to 255-270 C, according to U.S. patents 2,916,475-6.

Methyl-Group Help: At least two firms are studying methyl-substituted xylylene-containing polyamides. Monsanto Canada Ltd. is working with polamides of 2,4-bis(aminomethyl)toluene—a methyl-substituted *m*-xylylenediamine—and either aliphatic acids (Australian patent application 57,707) or 2,4-bis(carboxymethyl) toluene (Australian patent application 62,-088).

The product made by using an aliphatic acid is similar in structure and properties to California Chemical's MXD6. But using the substituted aromatic compounds for both portions of the polyamide gives a nylon with one big advantage: resistance to acids. It resists several hours' boiling in 7N hydrochloric acid, also has a melting point of 266 C and very low moisture pickup.

In British Nylon Spinners' British patent 825,096, aliphatic diacids or diamines react with dimethylamino or dicarboxy derivatives of durene (dimethyl-substituted xylylene compounds). The products are said to have "improved properties" and a melting point suitable for fiber spinning.

As in other lines of research, it'll take either significantly lower price or greater capabilities for any of these novel nylons to win commercial use.

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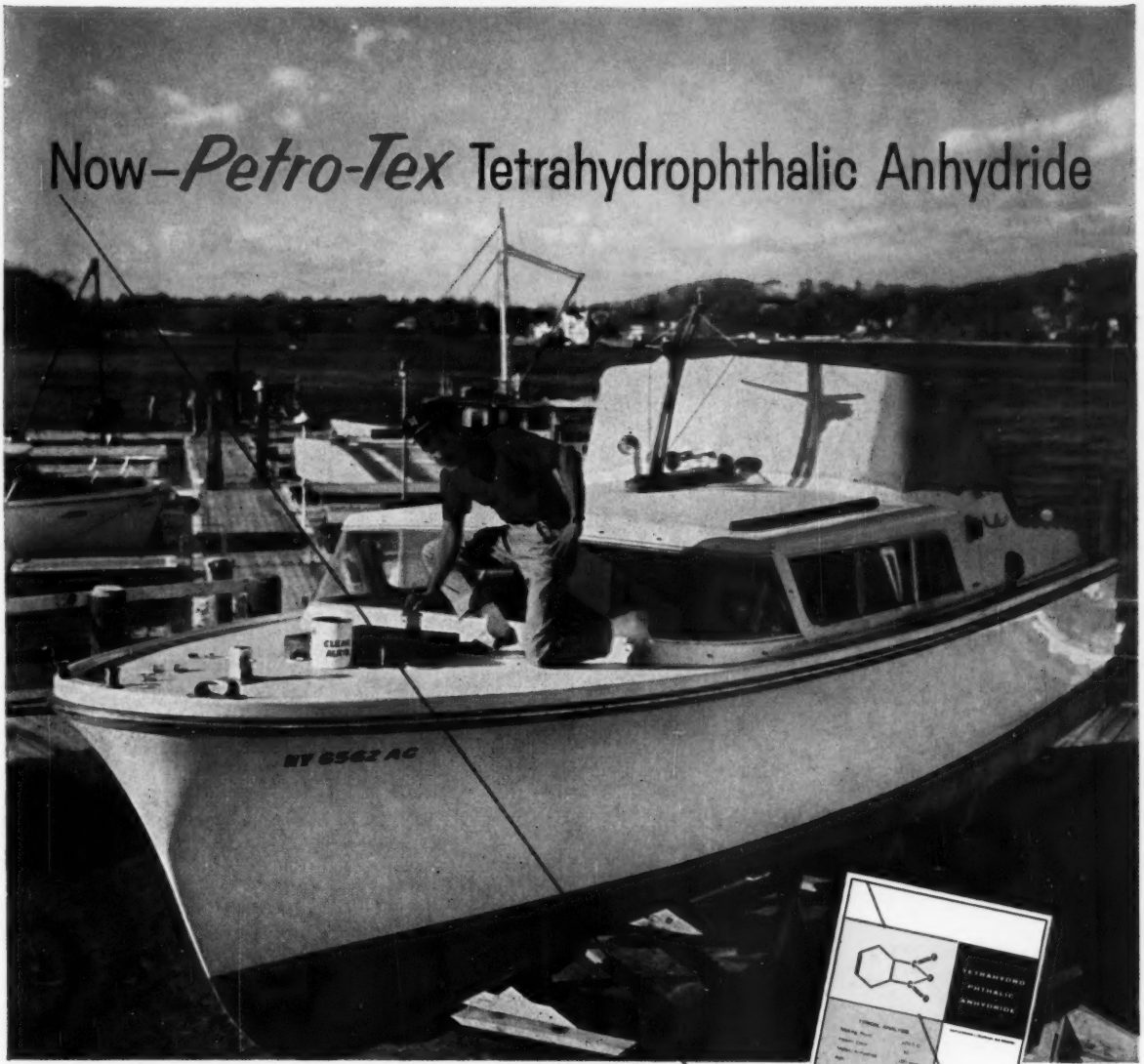

30′ Pearson Fiberglass Cruiser photographed at White Griffith Marine

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Lined Valves Pass Tests in Plant Service

Case histories help engineers develop patterns for evaluating plastics and alloys to be tried in chemical service. Plastics are gaining acceptance, but their limited resistance to high temperatures and pressures bars them from serving in many jobs.

This week Celanese revealed some impressive records of plastic-coated valves in hot, corrosive, long-term applications. Also, within the past few weeks, Esso's Bayway Refinery has shown how plastic-coated valves performed well under corrosive, high-temperature conditions.

Both cases prove the continued interest in a type of construction that promises relatively cheap valves that need minimum maintenance, and are suitable for rugged service conditions. But there's a rub—despite the increasing frequency of reports on plastic valve usage, it is still difficult for the chemical engineer to sort out the various case histories, pick out a use pattern that will help him select the special construction material that will best suit his company's needs.

Esso Bayway's report on over two years' use of Penton-coated valves shows that the stainless steel valves that they replaced cost two and a half times as much, lasted only about one and a half years. But, as an engineer at one large chemical company points out, the tests are on plug valves (supplied by Rockwell-Nordstrom [Pittsburgh]). Can he count on similarly lined gate valves (which his firm prefers) performing as well?

A satisfactory plastic-coated gate valve has yet to be developed. The gate-valve stem exerts pressure on the valve seats, and the sharp corners that are inherent in the design damage the plastic coating. A number of manufacturers are trying to solve this problem, but until it is solved, many companies will stick with valve bodies lined with hard, natural rubber and fitted with alloy (usually Hastelloy) gates and valve seats.

Use Pattern: Nonetheless, useful patterns in lined valve performance are beginning to show up. The accumulation of data is helping break down the production engineer's wariness of special construction materials —and it is also setting clear limitations on the use of others.

For example, many engineers worry about the problems of pinholes in plastic coatings. The long-service case histories, such as those reported by Celanese and Esso (both of which tested Penton-lined units), show that coating reliability is high. Usual coatings are 20-30 mils thick, are applied by one of three techniques: Polymer Corp.'s (Reading, Pa.) fluidized-bed method (*CW, May 2, '59, p. 89*), Pfaudler's (Rochester, N. Y.) water-suspension method, or Hercules' organic-dispersion method. And all have made good records.

Most coating failures (which have averaged about 1%, according to Rockwell) result from physical damage—caused either by abrasive material in the fluid or (in Rockwell's case) by using the plug valve for throttling.

Some chemical companies also report that they shy away from plastic coatings such as Penton because of water permeability. If a line is not full there is high humidity in the freeboard area, which may cause blistering of the coating. To overcome this producers use sheet lining materials, usually ⅛- 3/16 in. thick.

The diaphragm-type valves, made by firms such as Grinnell (Providence, R. I.), Hills-McCanna (Chicago) and Saran Lined Pipe Co. (Ferndale, Mich.), have probably moved in most effectively in the lined-valve field. The most common lining material is Penton (chlorinated polyether), used with Teflon-faced rubber diaphragms. The William Powell Co. (Cincinnati) also has a Penton-lined valve.

Plastic Limits: Most of the recent valve case histories show the major weakness of plastics to be lack of high-temperature resistance. For example, polyvinyl chloride has good general chemical resistance but has been limited to service below 140 F. Some valve makers (e.g., Cooper Alloy, which makes solid plastic valves) have been experimenting with new, high-temperature PVC that will withstand temperatures above 150 F, but production models aren't ready yet.

Penton, which has good acid resistance, is generally not considered for service above 200 F, although Hercules has some service data covering temperatures to 250 F. One chemical company limits itself generally to three lining materials: rubber, saran and Teflon. Rubber isn't used above 200 F; saran is used for low-temperature service because it has better solvent resistance than rubber. Teflon has high-temperature resistance, but only valve parts (e.g., seats) are available.

Firms using Teflon-lined piping usually resort to glass-lined valves. Generally, glass-lined valves have good temperature resistance to 350 F, although at high pH, temperatures must be limited to about 212 F. Crystalline glass, such as Corning's Pyroceram and Pfaudler's Nucerite (*CW, Sept. 24, '60, p. 47*), are aimed at pushing temperature and strength up. Glass has another limitation: it can't be used on curves with less than 8-in. radii—ruling out small sizes. In glass units, a seal such as Teflon is needed — which rules out butterfly, plug and ball valves (although interest is high in developing a glass-lined ball valve). Firms such as Tube Turns Plastics (Louisville), Kraloy-Chemtron and Cooper Alloy are now producing solid plastic ball valves.

The temperature limitations of lined valves has been one of the main factors in keeping the major alloy valve makers, such as Alloy Steel Products (Linden, N. J.) and Cooper Alloy (Hillside, N. J.), in the thick of the fight for special materials of valve construction. In fact, Cooper Alloy says its alloy valve business is actually increasing. A factor: the chemical industry's increased emphasis on high-temperature, high-pressure processing. Higher pressure service, of

course, rules out many of the potential applications for solid plastic valves, which usually have pressure limitations of about 150 psi.

The case histories on valve usage show that as experience is gained in the use of various lining materials, it is becoming increasingly clear that no single material has all the needed physical properties. But where plastics can be used, they can help keep valve costs down.

Teardrop Crystallizer

A new type of crystallizer is being readied for its chemical industry debut by Chicago Bridge & Iron (Chicago). If it lives up to its advance notices, it will lower construction costs, produce better crystals, and operate at lower cost than conventional units.

The new crystallizer is shaped like an ice cream cone standing on its tip. According to CB&I, this shape requires minimum wall thickness to withstand internal and external pressure differences, thus cuts material costs. It is claimed to be structurally stronger per pound of metal than other crystallizers with cylindrical bodies and flat, dished or conical bottoms. And the unit can be constructed with integral legs that eliminate conventional steel structural supports.

CB&I says better crystals are formed because there is a maximum liquid surface exposure per unit volume of liquid. Agitation is relatively less and the temperature difference between liquid and vapor at the boiling surface is smaller compared with other shape crystallizers. The flow characteristics inside the crystallizer permit the formation of bigger crystals, which can be pumped out easily, before they bridge or form scale on the walls.

The cone-hemisphere design has less radiating surface per unit volume—this conserves heat and cuts insulation costs, CB&I says. In addition, the boiling surface is at the maximum cross-sectional area, so there is a comparatively large vapor release area.

CB&I admits however, that there are certain limitations to its design. The unit works best on feeds with a water solvent. And it is recommended only for medium- (8 ft.) and large- (17 ft.) diameter units. Crystallizers smaller than 8 ft. in diameter lose most of the design advantages.

WHAT'S NEWS IN ENJAY TECHNICAL SERVICE

Enjay helps reduce cost of 90°C vinyl wire insulation...

An important part of Enjay Technical Service is developing useful new products that reduce costs, yet maintain performance. Ditridecyl phthalate for use in plasticizing vinyl wire insulation is a good example of this research activity. By tests, such as the oven aging shown above, Enjay was able to prove that DTDP, made from Enjay tridecyl alcohol, performs as an efficient, non-volatile plasticizer for 90°C wire — yet reduces plasticizer cost. Test results, at right, show that the insulation exceeds the U.L. Specifications.

Enjay research facilities and technical skills are available to customers in the vinyl wire, film and sheeting industries.

If you would like to receive a free copy of our new Technical Bulletin No. 20 on Enjay oxo alcohol for plasticizers, write to 15 West 51st Street, New York 19, N. Y.

TEST RESULTS: 7 DAYS @ 121°C

	U.L. Specification Minimum	DTDP Plasticizer
Elongation	65% retention	100% retention
Tensile Strength	65% retention	101% retention
Dielectric Strength	50% retention	127% retention
Insulation Resistance*	.01 megohm based on 1000 ft.	0.36 megohm based on 1000 ft.

* 1 day and 7 days @ 113°C.

EXCITING NEW PRODUCTS THROUGH PETRO-CHEMISTRY

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EQUIPMENT

Floor-Joint Filler: Pennsalt Chemicals Corp.'s Corrosion Engineering Products Dept. (Natrona, Pa.) is out with a new chemical-resistant joint filler to solve floor expansion and contraction problems. Called Flexjoint, the filler bonds to concrete and brick, has high load-bearing ability, remains flexible over a wide temperature range. The filler can be formulated as a pourable material that sets in three hours, cures in 24 hours.

•

Electrostatic Precipitator: American-Standard's Industrial Division (Detroit 32, Mich.) is offering a new electrostatic precipitator with high collection efficiency and low dust reentrainment. The unit has flat collector plates which contain pockets that trap and hold the dust. The units are custom-built using modular techniques that increase factory preassembly, minimize field construction.

•

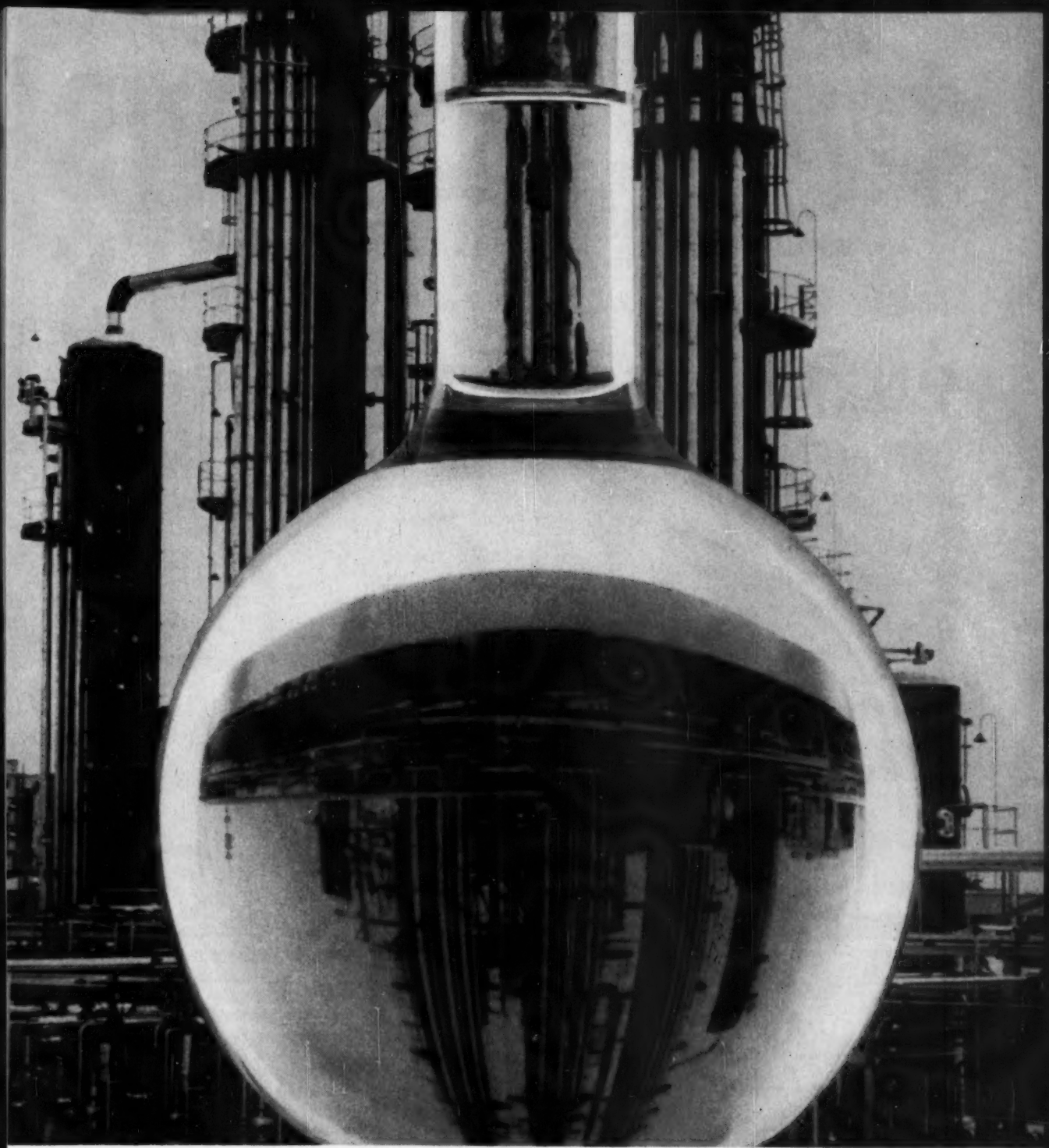
Glass Lathe: A 77-lb. glass lathe for the unskilled glassblower is a new product of Bethlehem Apparatus Co. (Hellertown, Pa.). Contour chucks with self-centering jaws on each side permit centering of tapers, bulges, odd shapes. The burner carriage holds a variety of torches and lathe fires. It will hold tubing up to 64-mm. diameter through the spindle and shapes up to 6-in. diameter on the outside of the chucks. Maximum distance between chucks: 19½ in.

•

Plastic Welding Tips: Laramy Products Co. (Cohasset, Mass.) is out with a new kit of welding tips for plastics that it says cuts the cost of a complete assortment of tips in half. The kit includes one basic stainless-steel lining tip and five attachments (e.g., flat and V tips) for welding all thermoplastics such as polyvinyl chloride, polyethylene and polypropylene.

•

Teflon Seal: Raco Engineering (1650 21st St., Santa Monica, Calif.) is offering a new line of spring-loaded Teflon pressure seals for cryogenic fuels, oil, gas and chemicals. The seals have a stainless steel spring insert that acts as a compensating pressure on the Teflon. The new seal adjusts to out-of-round and warped flanges, fits any flange. Temperature range: —420 to 500 F.



Arizona's new rectifying towers as photographed through a flask of ACINTOL® FA3 Fatty Acid

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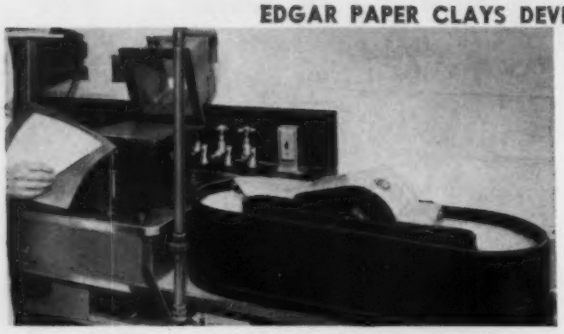
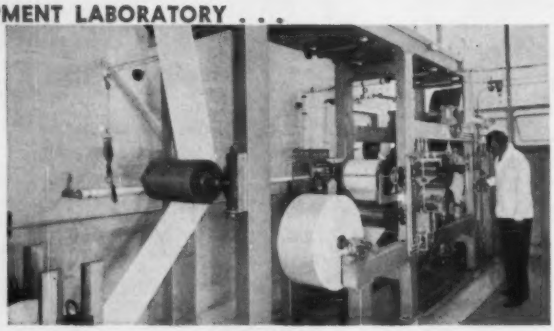
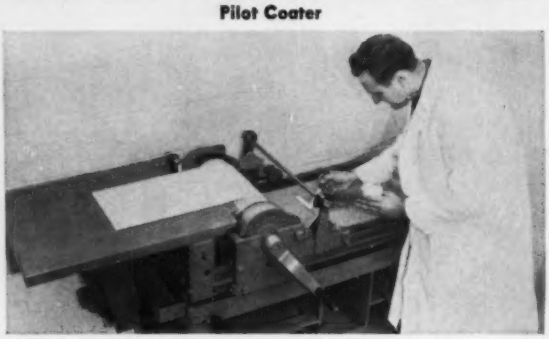


Wet Lab



Pilot Coater

Calender



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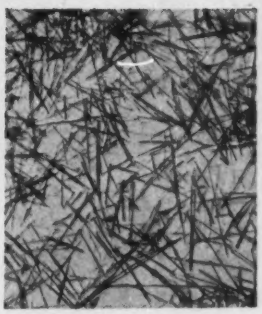

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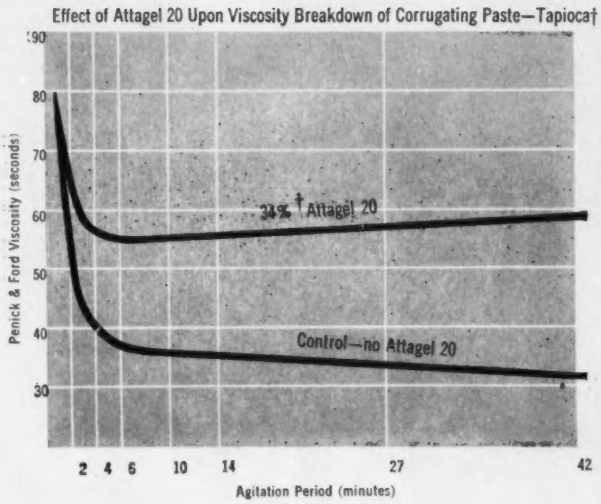

†Based on starch solids in the carrier portion of the paste.

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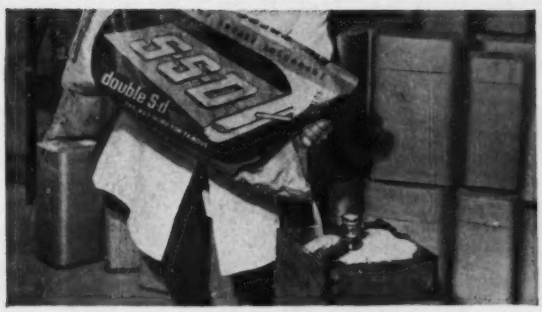

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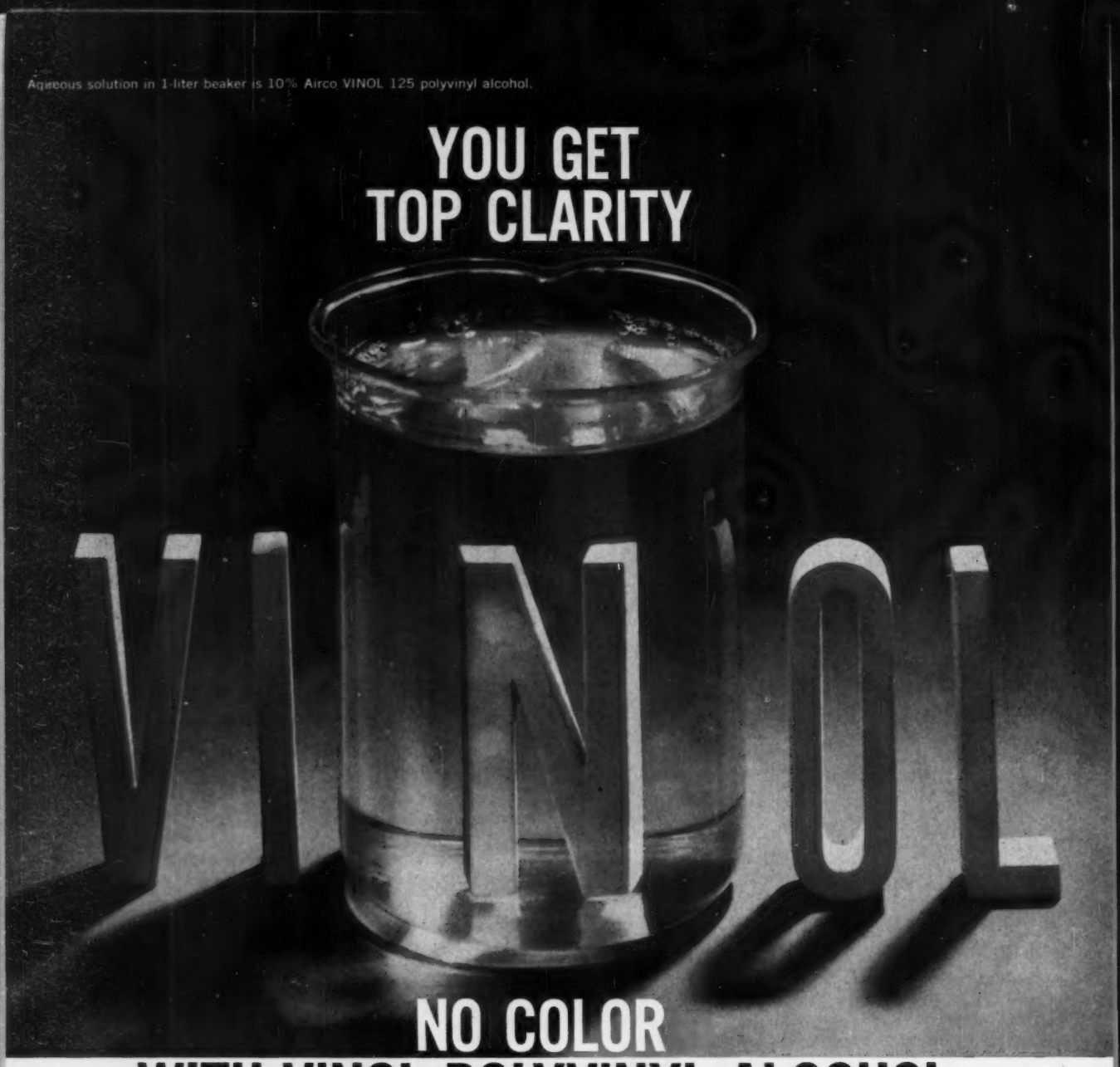

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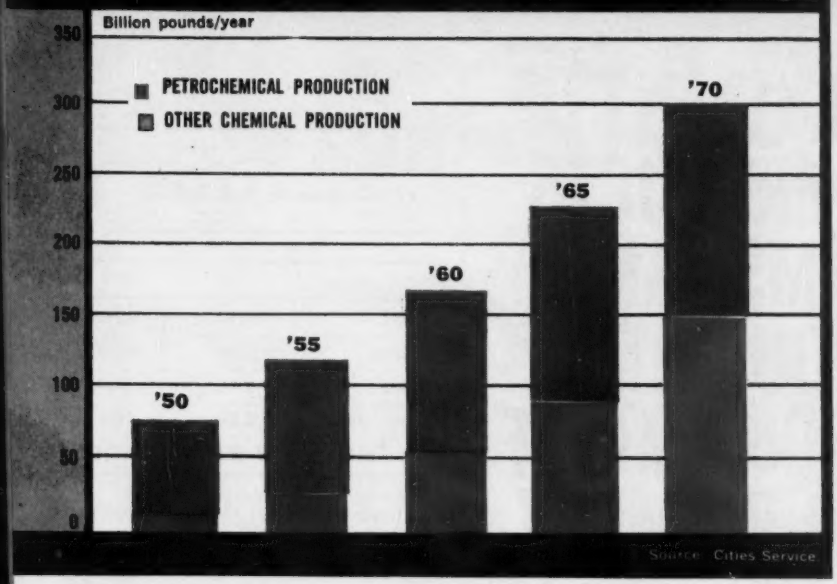

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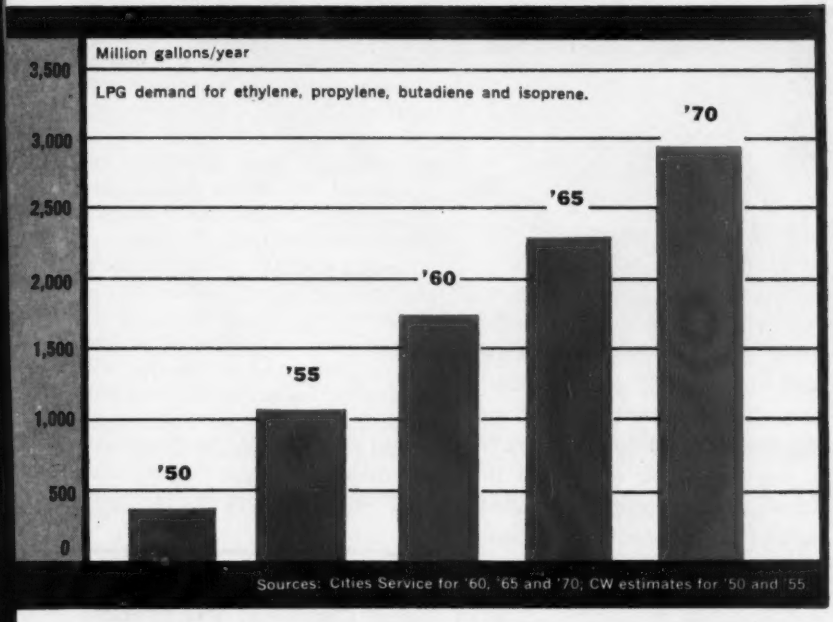
Is Boosting LPG Demand



LPG Chalks Up New Gains

At the recent meeting of the Natural Gasoline Manufacturers' Assn. in Dallas, Tex., the spotlight focused on the mounting importance of liquefied petroleum gas (LPG) in the chemical process industries. Reason: demand for LPG as a source of raw materials for petrochemicals is soaring (*chart, above.*)

Cities Service's Research and Development Co. Vice-President Howard Malakoff pinpointed the importance of LPG to the petrochemicals industry. In '60 four large-volume basic petrochemicals—ethylene, propylene, butadiene, isoprene — consumed 1.9 billion gal. of LPG. (These four products accounted for nearly two-thirds of the 3.03 billion gal. of LPG utilized by all of the chemical industry in '60.)

By '65 these chemicals will use 2.4 billion gal./year, pass the 3-billion-gal./year mark by '70 (*chart*).

It's estimated that in '60 total LPG production in the U.S. hit 9.86 billion gal., 10 times the amount produced in '50.

Domestic and commercial heating still represents the major outlet for LPG. Last year this application took about 4.3 billion gal., 43.9% of total demand for the gas. Although this use registered a 10% increase over the previous year, its share of the total market decreased. Reason: demand for petrochemicals manufacture is growing faster. All other nonchemical uses took 2.53 billion gal.

Splitting Up the Market: LPG consists of the following fractions: ethane, propane, butane, C_5 (mixed materials containing five-carbon atoms per molecule) and naphtha (*see table, p. 108*). The largest-volume fraction going into the four petrochemicals (ethylene, propylene, butadiene, isoprene) is butane. According to Malakoff, about 770 million gal. of butane from LPG were consumed by the four big petrochemicals in '60. This total will swell to 990 million gal. by '65, 1.2 billion gal. in '70.

The next-largest fractions are propane and ethane. Last year the four bread-and-butter petrochemicals took 500 million gal. of LPG-derived propane and 360 million gal. of LPG-derived ethane. By '70 these requirements will expand to 810 million gal. of propane and 620 million gal. of ethane.

The C_5s and naphtha will bring up the rear; consumption is estimated at 460 million gal. by '70. Demand in '60 was 270 million gal. (*chart*).

The main reason for these increased requirements during the next decade is, of course, the expected over-all growth of the petrochemicals industry. In addition, new pipeline systems throughout the country are making available low-priced natural gas liquids in ever increasing supply.

Moreover, there's a significant refining trend under way toward higher recovery of propane and ethane from natural gas liquids. New plants are now being designed to recover 75-90% of the available propane in a wet-gas stream. Back in the '40s economic recovery of 35-60% was the best obtainable. And recently installed ethane recovery units can recover about 50% of the total ethane in the wet stream. This compares with an

Estimated Petrochemicals* Demand for LPG

(million gallons/year)

	1960	1970
Ethane	360	620
Propane	500	810
Butane	770	1,200
C_5 and naphtha	270	460
Totals	1,900	3,090
Growth rate 1960-65		5.5%
Growth rate 1965-70		4.0%

Source: Cities Service.
* Ethylene, propylene, butadiene, isoprene.

economical recovery figure of 20% for older units.

Petrochemicals Moving Up: In the next 10 years LPG will be riding the growth curve of petrochemicals, whose growth relative to over-all chemical production is highly significant.

In '40 about 2.5 billion lbs. of petrochemicals were produced; this represented 10% of total chemical output. By '50 petrochemical production had grown sixfold, to 15 billion lbs., accounted for 20% of total chemical output. Last year 55 billion lbs. of petrochemicals were produced, hiking their share of total chemical production to 32%. And by '70 they will account for one-half of the total 300-billion-lbs. chemical production.

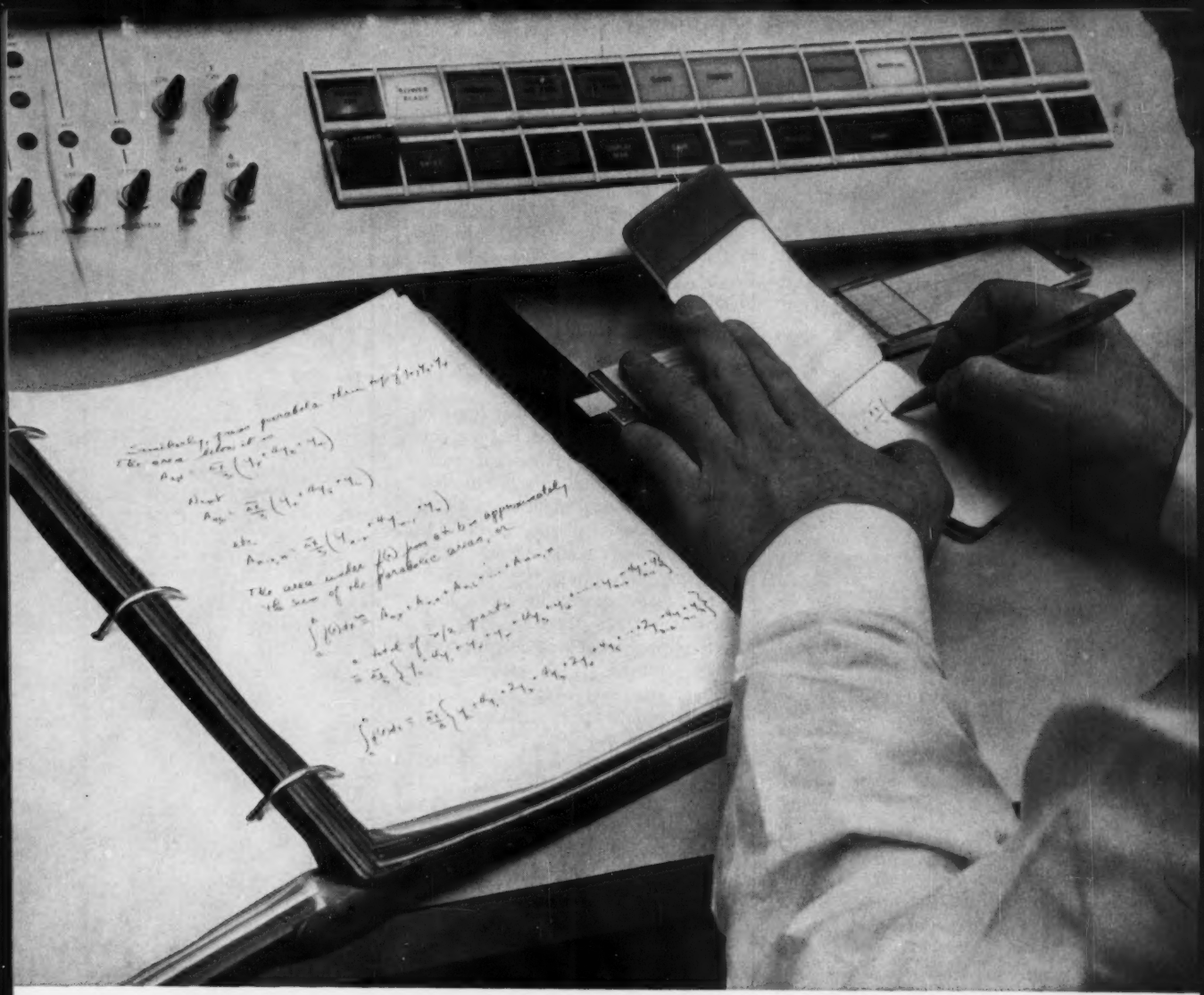
The four primary petrochemicals will continue to expand rapidly with the over-all expansion of petrochemi-

Petrochemicals versus Total Chemical Production

(billion pounds/year)

	Total Chemicals	Total Petrochemicals	Percent Petrochemicals
1935	20	1	5
1940	25	2.5	10
1945	65	10	15
1950	75	15	20
1955	120	30	25
1960	170	55	32
1965 (est.)	225	90	40
1970 (est.)	300	150	50

Source: Cities Service.



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cals. Production of these basic building blocks reached 9.9 billion lbs. in '60, and the total is expected to be 13.4 billion lbs. in '65, 16.8 billion by '70. Ethylene and propylene will register the largest poundage gain. And as these products grow, LPG will continue to gain in importance as a source of raw material for them.

MARKETPLACE

Paperboard Entry: A new type of high-barrier paperboard is being offered this week by Potlatch Forrests Inc. (Lewiston, Ida.) in a bid to compete in packaging applications where previously only plastic, metal and glass containers could be used. This company is reportedly the first U.S. paper manufacturer to offer commercial quantities of the new material—a polyvinylidene chloride-coated paperboard. If it performs as claimed, the new board could carve out a sizable share of the total packaging market. Advantages claimed for it: (1) excellent grease and gas resistance, (2) cheaper to use than greaseproof or polyethylene-coated paperboard, (3) it's flexible, can be scored and folded.

Initial output: for making bakery boxes, meat trays, picnic plates, cups. Among potential applications: packages for frozen foods and sauces, syrups, milk, motor oils, fertilizers, chemicals, drugs.

•

Blown Vinyl Booms: During '60 the market for blown polyvinyl chloride foam advanced to about 12.5 million linear yds. (54-in.-wide material)—a fivefold increase over 59's total 2.5 million yds. In pounds of PVC, this is a gain from about 1.7 million lbs. in '59 to 8.2 million in '60. And it's said to be just hitting its stride; the market is expected to expand to about 38 million yds. by '65—taking about 25 million lbs. of polyvinyl chloride.

Last year insulation for apparel was the biggest market for blown vinyl foams, consuming 9.4 million yds. In the future, however, vinyl foam is expected to face stiff competition from polyurethane foams for insulation use. But it's predicted that other uses will take up the slack. The largest gains are expected in automotive and furniture upholstery. However, the other numerous applications will also grow in importance.

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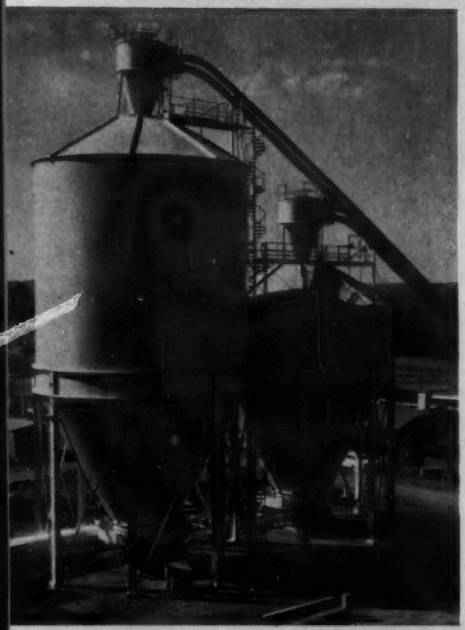

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PROVO, UTAH.....P. O. Box 310
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NEWARK (2).....744 Broad Street
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ATLANTA (5).....361 East Paces Ferry Rd., N.E.
DALLAS (1).....Suite 1703, Southland Center
DENVER (2).....323 Railway Exchange Bldg.
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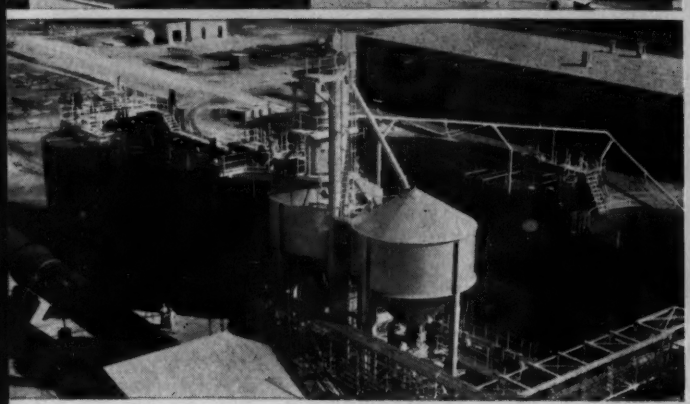
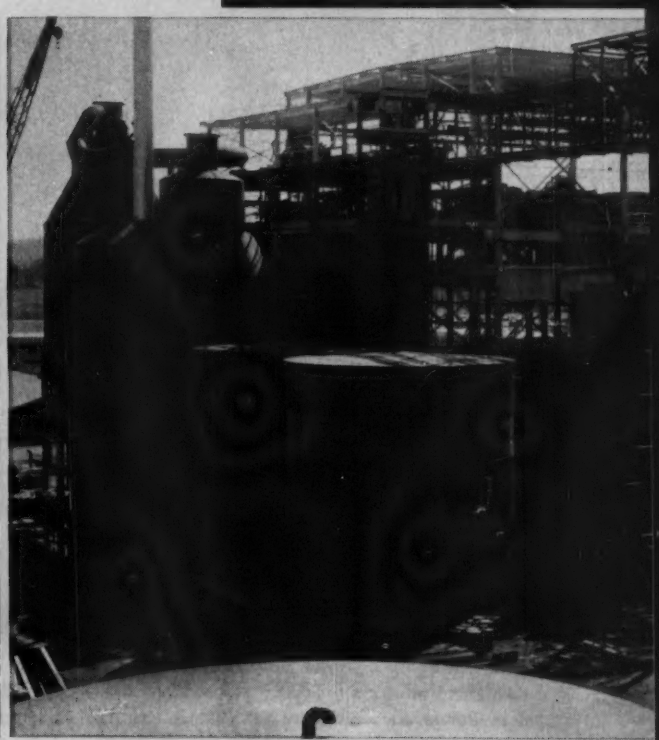
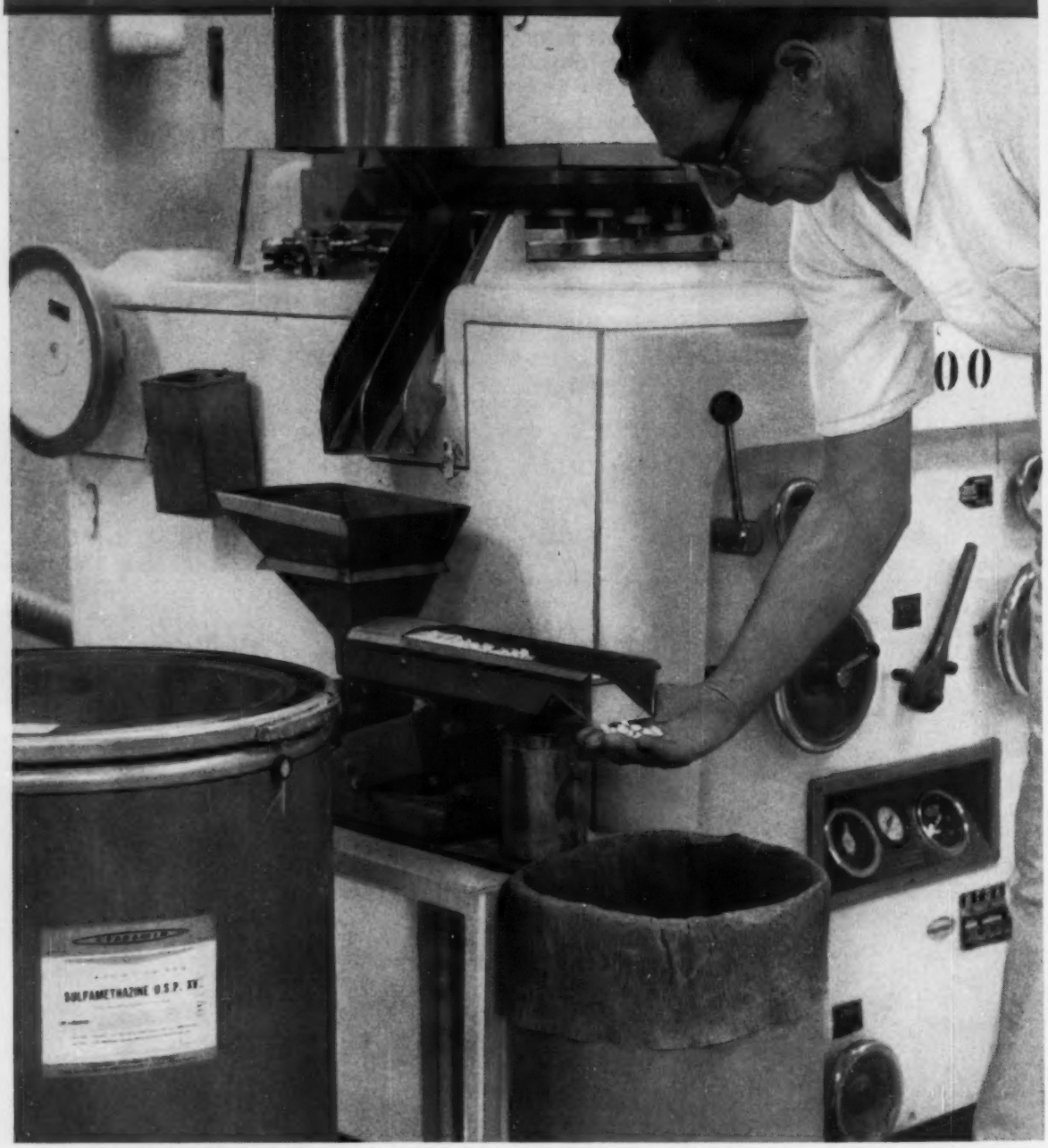




37 Steel Tanks and Bins for Tennessee River Pulp and Paper Co. at Counce, Tenn.

CYANAMID

Chemical Newsfront



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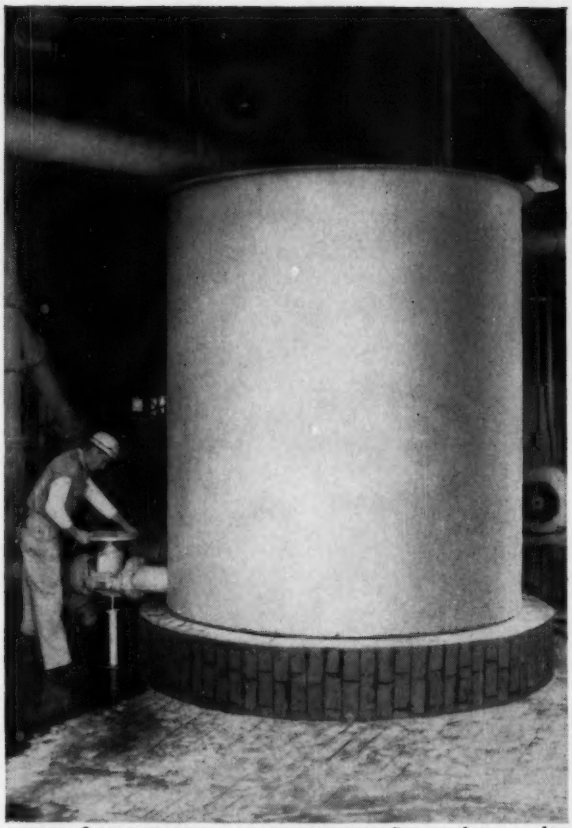
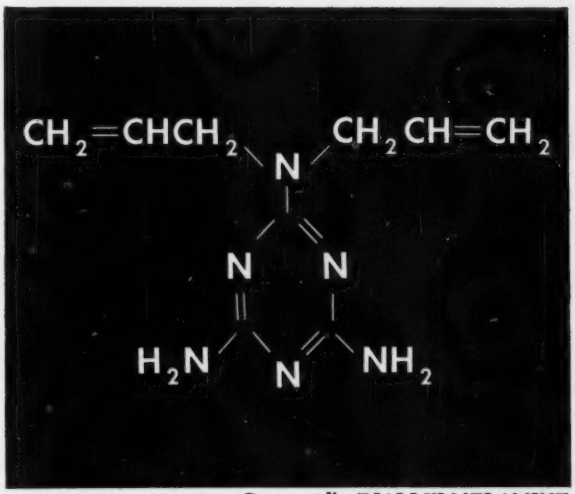


LAMINAC® POLYESTER RESIN FIGHTS OFF ACID. It costs less to solve industrial corrosion problems with Cyanamid's LAMINAC. The wash acid storage tank above is made of glass-reinforced LAMINAC —resistant to corrosion by phosphoric acid, sulphuric acid and gypsum. Tough corrosion problem? Look into LAMINAC.
(Plastics and Resins Division)



EPOXY RESIN CATALYSIS. Cyanamid's DIALLYLMELAMINE (DAM) provides fast cure for epoxy resins above 130° C, coupled with outstandingly long pot life at room temperature. The residual allyl groups may be reacted with other unsaturated systems to modify the epoxy product. **(Market Development Department)**

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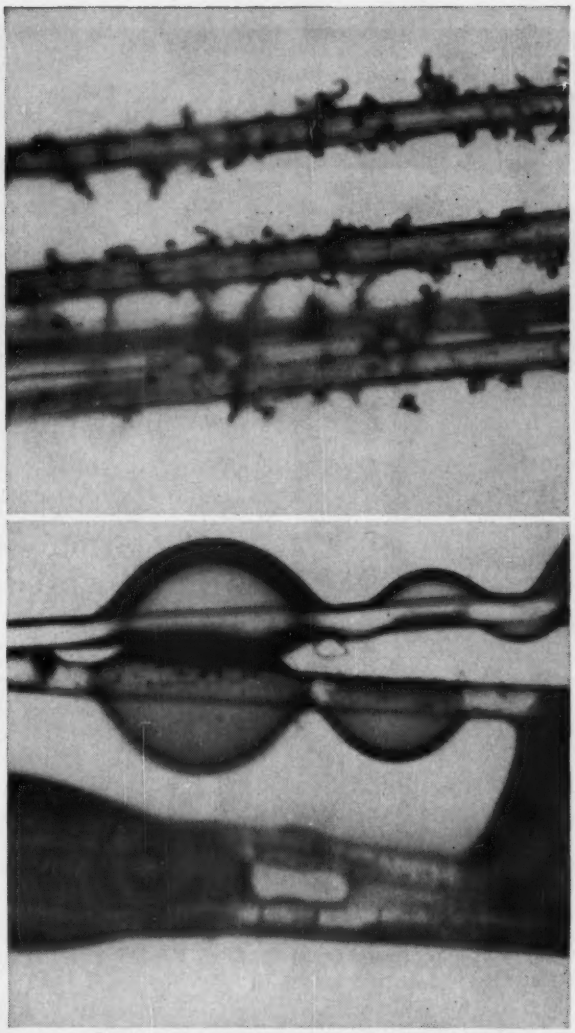

CYANATEX® DYEING ASSISTANT EM DYE-SOLVENT CARRIER speeds penetration of dye. Above, Cyanamid's Cyanatex has formed colored globules that attach readily to polyester fibers. There is no dye-carrier precipitate build-up as on the fibers at top. Because Cyanatex diffuses more readily into the fiber, polyesters, triacetates and acetates achieve brighter, heavier shades. **(Dyes Department)**

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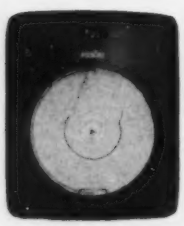

Foxboro pH Dynalog Controller — for use where it is desired to hold pH at a predetermined value.

Foxboro pH Dynalog Indicator — for use where complete record of pH value is not required.

THAT'S RIGHT — the intermediate amplifier is gone from Foxboro's new low-cost system for measuring pH. And gone with it is the wasted panel space, the drift, the daily standardization inherent with earlier systems.

In the new Foxboro system, the signal from the pH electrode goes direct to a high impedance Dynalog* receiver — without intermediate amplification. Signal operates a direct-reading indicator or recorder—or a controller and alarms, when desired.

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Market Newsletter

CHEMICAL WEEK
April 15, 1961

cis-Polybutadiene synthetic rubber production is now under way at Firestone's new, 30,000-long-tons/year plant at the Firestone Petrochemical Center in Orange, Tex. Initial output consists of Diene rubber (used to blend with natural rubber), but the plant can also turn out Coral rubber (polyisoprene)—a complete replacement for natural rubber.

While Firestone is said to be the first tire manufacturer to make polybutadiene rubber on a commercial scale, chemicals maker Phillips has been making *cis*-polybutadiene at its own plant at Borger, Tex., since last summer.

Firestone remains a net buyer of butadiene, the raw material used to make polybutadiene rubber. About half of the 60,000 tons/year of butadiene that Firestone can make at Orange is tabbed for use in polybutadiene rubber production at the same site. Hence less can be piped to the firm's 200,000-long-tons/year SBR plant at Lake Charles, La. The deficit must come from outside sources.

Petroleum Chemicals wants to make sure it will continue to supply Firestone with butadiene at Lake Charles after the current PCI-Firestone contract runs out. (PCI has about 80,000 short tons/year of butadiene capacity at Lake Charles.)

But there's a catch to the contract renewal. Firestone has told PCI it will have to hike butadiene purity above the 99% level before '65; hence PCI is now pushing a major program designed to up product purity to 99.3% or better. Among purification techniques PCI is investigating: Podbielniak extractors.

•

Behind the scenes this week at the National Packaging Exposition in Chicago these provocative developments in the making:

• Carbide is looking harder—and finding more reasons—to consider going into manufacture of rigid plastic containers. For one, there's growing dissatisfaction with second-hand product testing and markets data-gathering that now comes primarily through fabricators using Carbide plastics. Officially Carbide has denied intention of getting into the plastic-bottle race, which Dow joined last month (*CW, March 25, p. 40*).

• Cellophane users will get more for their money because of improved sheet-forming techniques developed by Du Pont. Price per pound will remain unchanged, but users will get more square feet per pound. Example: bread-wrap grade previously ran about 21,000 sq. in./lb., will now go up to as much as 25,000 sq.in./lb.

•

Meanwhile, a casualty in the packaging film business is Dow's methyl cellulose water-soluble film (Methocel). The product didn't go over because of troubles with heat-sealing and poor solubility in water at high temperatures. Although solubility is satisfactory at low temperatures, there

are no plans for limited-use sales. Reason: competitors can cover the entire field with one film.

There's no comment by Dow spokesmen about possible further research to iron out the bugs, nor any hint that other varieties of film might be forthcoming to put Dow back into the water-soluble film marketplace.

•

Another ethylene plant for Louisiana? That was the talk at this week's meeting of the Western Petroleum Refiners Assn. at San Antonio. Word is that Union Texas Natural Gas (Houston) is considering building a 200-million-lbs./year ethylene plant somewhere along the Louisiana Gulf Coast, probably in the Baton Rouge-New Orleans area. The company has natural gas liquid reserves in Louisiana, also operates several sizable natural gas processing plants.

•

Fissio-chemical hydrazine is pressuring current prices of the chemical into lower brackets. Word is that Olin Mathieson—which makes hydrazine by traditional chemical means—is now talking about a price range of under $1/lb. to its customers. That's substantially lower than the firm's current government contract price of $1.20/lb.

Development of hydrazine production by the fissio-chemical route is being pushed by Aerojet-General Nucleonics (*CW, Dec. 17, '60, p. 23*) but the process is still several years from commercial realization. Nonetheless, recent reports that the method may permit ultimate offerings at about 25¢/lb. (originally estimated at 50¢/lb.) appear to have been taken seriously.

AGN is now aiming at an Air Force contract to continue its hydrazine work. The firm's next problem: product separation and purification—probably a 30 months' job. Only then would AGN move into pilot-plant tests of the process.

But it's long-range pressuring at best. Best guesses are that AGN won't go commercial for about four to six years. AGN reportedly has so far exposed only about 10 cubic centimeters of Ammonia to radiation, obtaining yields in trace quantities. Extrapolation of such small-scale data into terms of multimillion-pounds/year commercial production—years away—makes price predictions debatable.

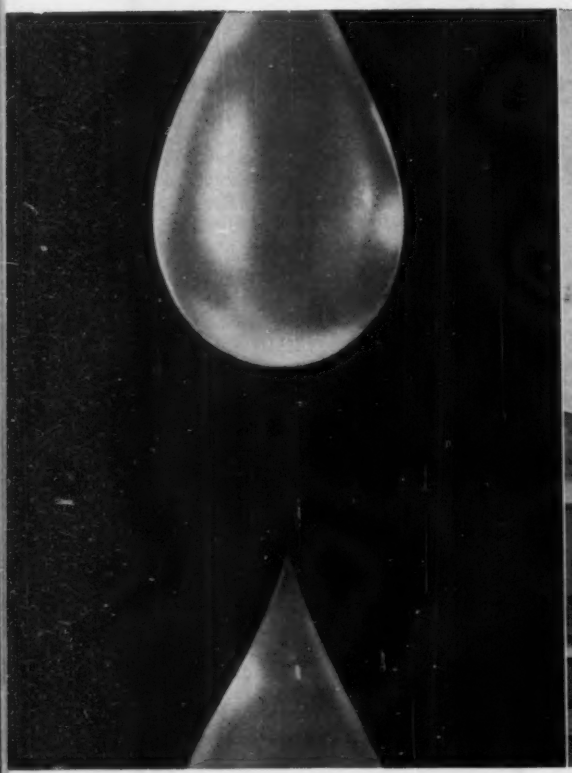
•

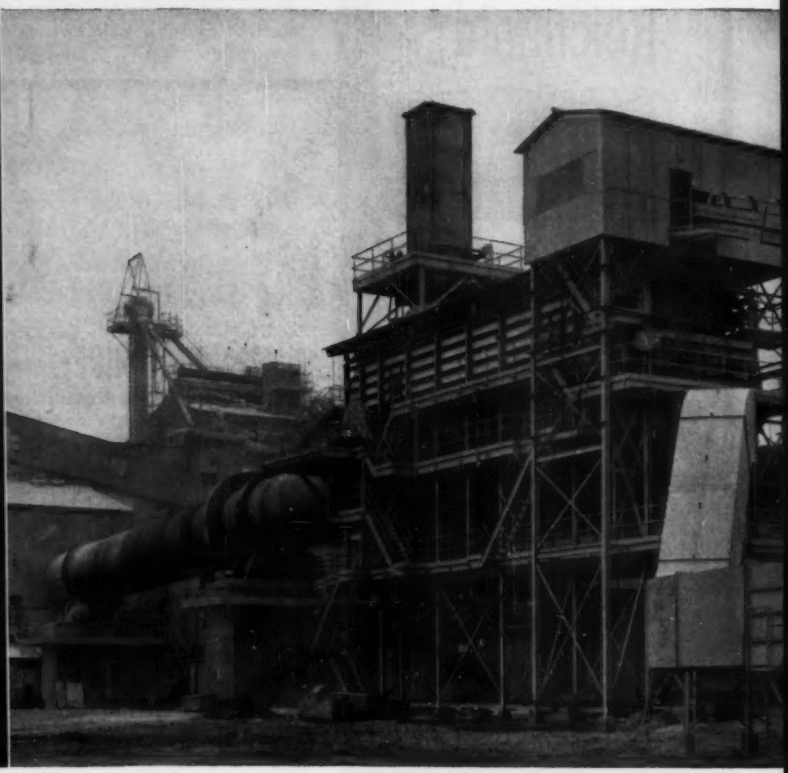
Meanwhile, Olin Mathieson is making dry runs of its new hydrazine plant at Saltville, Va., and plans formal opening about mid-May. Capacity of the new plant isn't publicized for security reasons, but is said to be "about four times the size of Olin's plant at Lake Charles, La."

•

A 2¢/lb. price reduction on p-tert-butylphenol posted by Dow Chemical brings tabs down to 23½¢/lb. in tank-car quantities, and 25½¢/lb. bagged, in carloads (freight allowed). The price cut follows closely Dow's ½¢/lb. price cut on phenol, which last week initiated an industry-wide pattern (*CW Market Newsletter, April 8*).

ideas and news:





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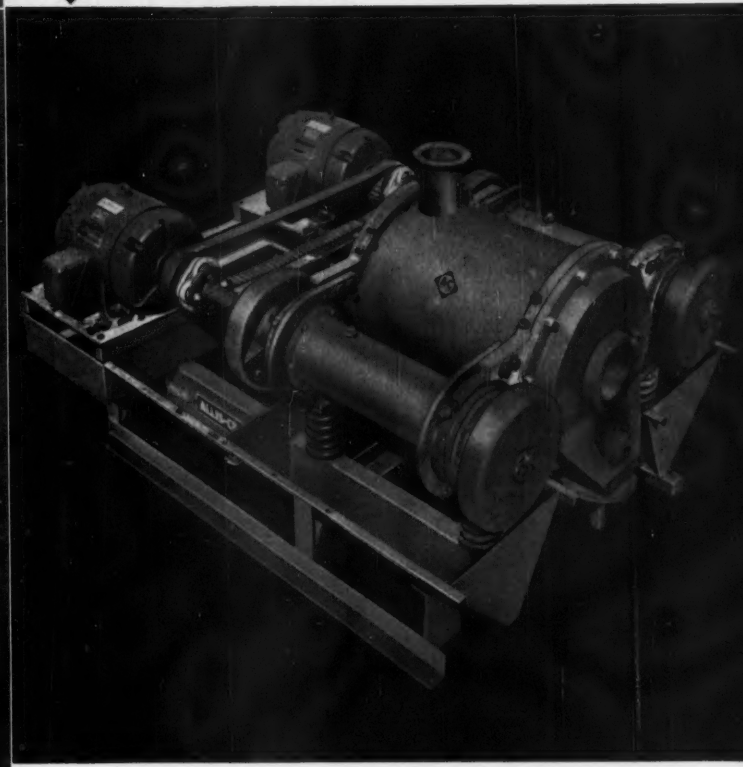
New coil insulation means fast service: Here's downtime insurance you may never need. The Silco-Flex insulation system on large Allis-Chalmers motors is so superior that coil failure is highly unlikely in ordinary service. Should failure occur, the usual 10-day rewind shouldn't be necessary. Usually eight hours is enough for the entire job of replacing the coil.

Compact, 30-inch vibrating mill: Can actually outproduce a conventional tumbling mill 15 to 30 times per unit volume . . . is powered by just two 50-hp motors. Grinding media occupy 80% of mill's 12-cu.-ft. capacity, grind wet or dry materials as fine as two microns, as coarse as 48 mesh. Adaptable to grinding in inert atmosphere, can be utilized for closed or open-circuit grinding.



So low, two fit where one used to go: This new SpaceMaker control center is the first completely new 2- to 5-kv motor controller development in more than a decade. Two-high design can cut floor space needs in half. Full drawout construction makes it the safest, most easily accessible controller available. Flame-retardent, track-resistant Super Pyro-Shield insulation adds reliability. Walk-in Shelter-Clad enclosures available for outdoors.

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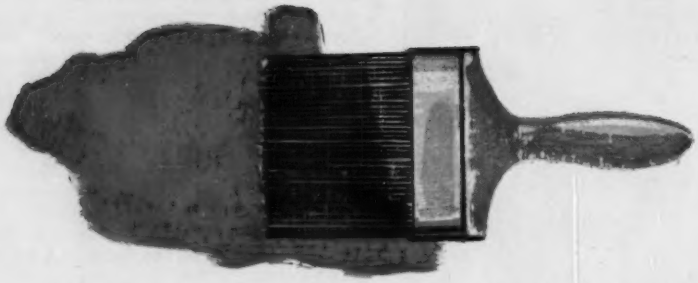

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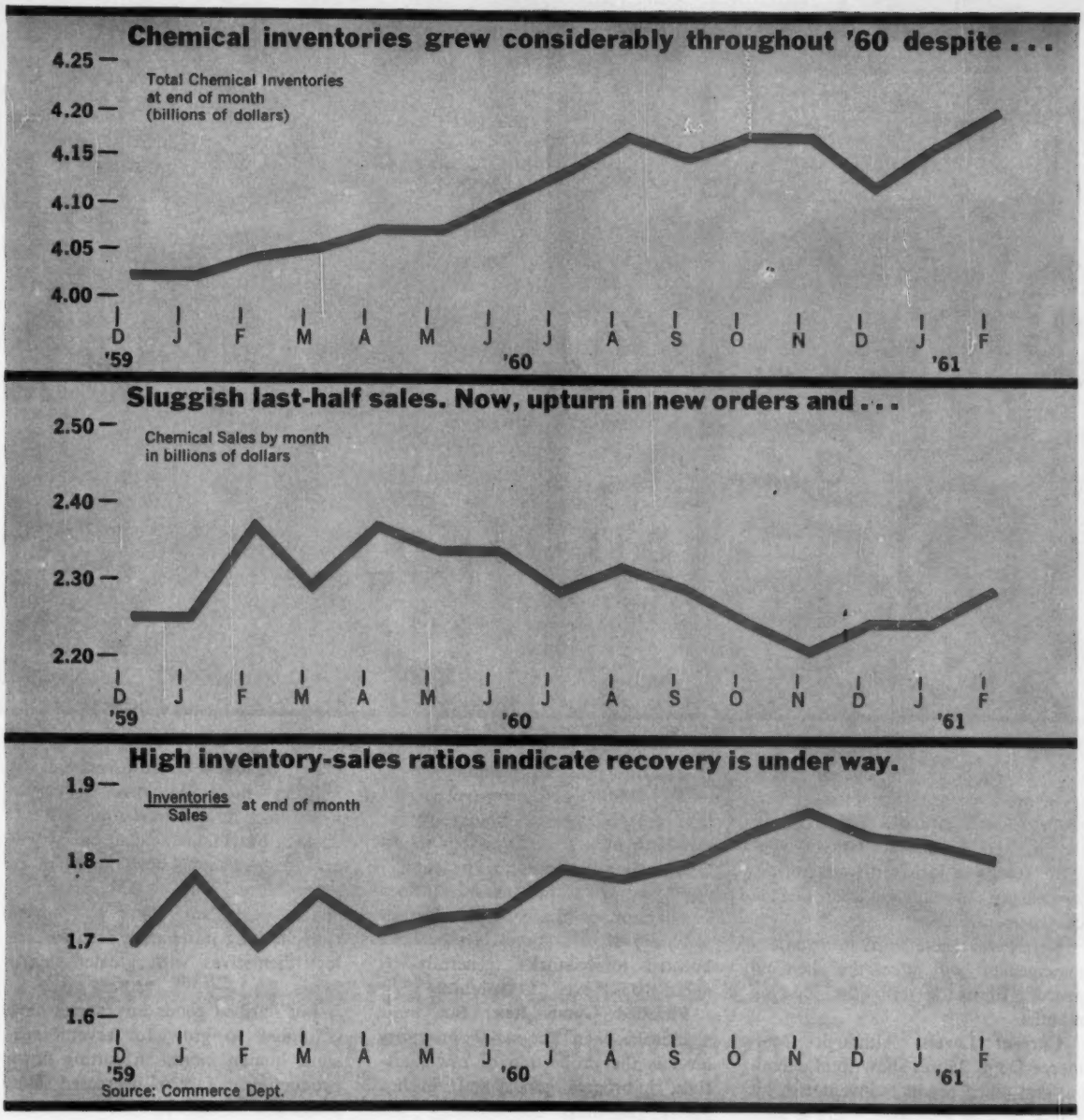


Inventories—High, Changing, Challenging

Chemical inventories are now at all-time high levels, reflecting the industry's readiness to cash in on the expected business recovery.

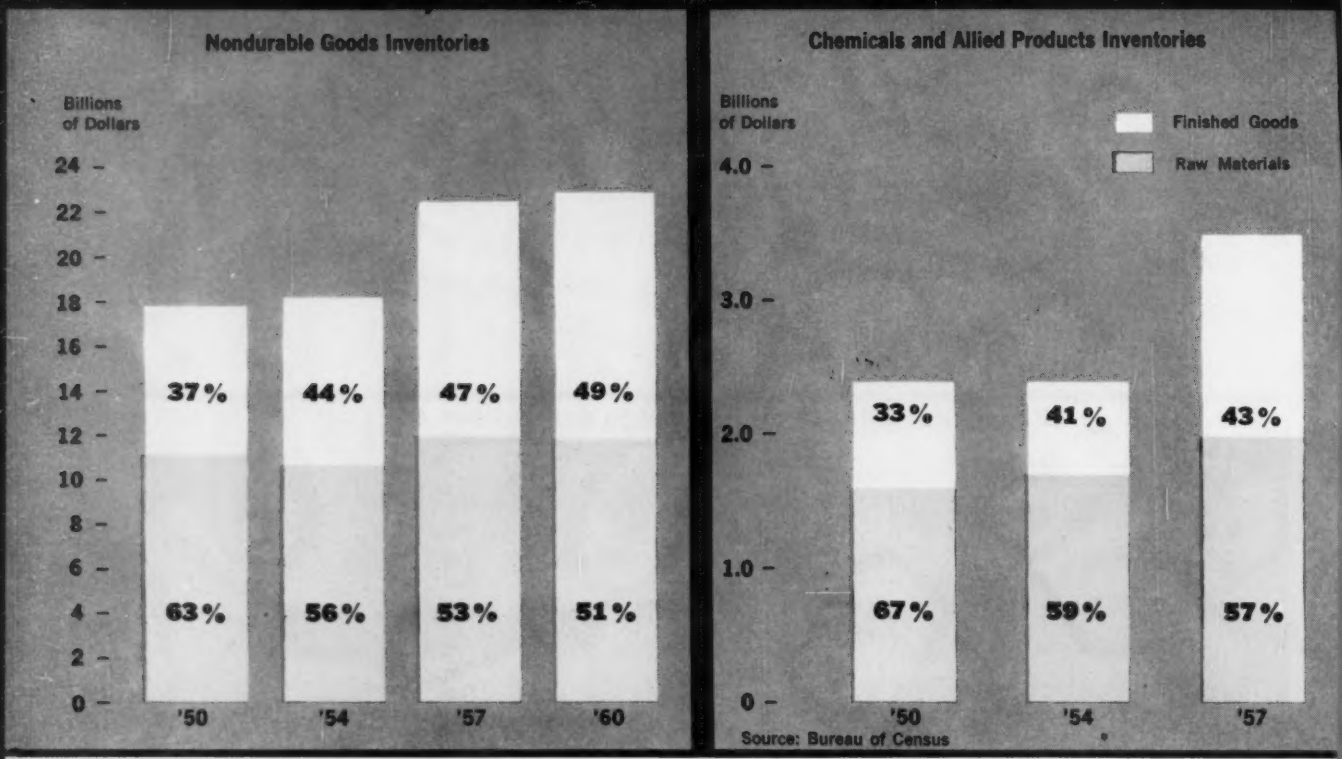
And these heavy stocks will grow even more in the months ahead, despite U.S. industry's efforts to keep them low, because of an almost unprecedented competitive situation that forces producers to maintain record finished goods inventories.

Although chemical manufacturers have been shifting more of their total inventory stocks into the "finished goods" category for longer than a decade, they haven't welcomed the change. Many companies have been able to trim their raw materials inventories to reduce costs. But almost all firms have been forced by a harsh buyer's market to maintain record quantities of finished and nearly finished chemical products—under the threat of losing sales to companies able to make immediate deliveries.

Chemical purchasing men have seized upon the situation to minimize their firms' raw materials stocks, depending more often than ever before on overnight deliveries, special handling and other measures that are costly.

And that's not all that has made

Finished Goods Spark the Inventory Build-Up



inventory management one of industry's more pressing problems. New methods and attitudes have further complicated the delicate task of managing stocks to satisfy manufacturing, purchasing, marketing and finance management.

Here's how these shifts in inventory management will affect the chemical process industries in the coming months.

Current Levels: Although Commerce Dept. figures show total chemical and allied products inventories hit a new peak in February, there is considerable variation among industry segments and companies. Naturally, agricultural chemicals are stocked heavily for the coming season. But among highly diversified companies, there is a marked difference in their current inventory positions.

American Cyanamid, for example, notes that year-end ('60) stocks were valued at $94.8 million, down nearly 5% from '59's $99.6-million stock level.

A diversified medium-size chemical and pigments maker similarly reports that its total inventories have been slashed from some $40 million in '52 to $28 million this year—all in the face of a doubled sales volume. While there are numerous firms that report total inventory levels down 10-15% from year-ago levels, there are also a sizable number that have not changed inventory levels appreciably, or have boosted total stocks (generally by about 10%) over '59 volumes.

Finished Goods Rise: But more significant than the total inventory level is the proportion of raw materials, in-process goods and finished goods that make up inventory. The charts (*above*) show the steadily increasing share represented by finished goods, offset by an almost identical reduction in raw materials stocks (in-process levels haven't changed). This holds true for nondurables, generally (including chemicals, petroleum products, textiles, rubber products, paper, foods and tobacco) and for chemicals and allied products, specifically.

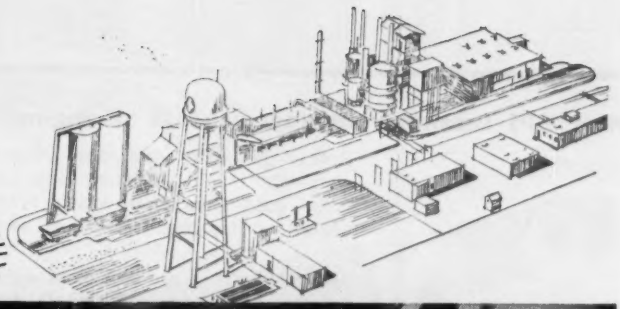
While this trend is evolutionary, and has been in progress for more than a decade, CPI companies report they have accelerated their raw material cutbacks, particularly in late '60. Naturally, relatively stable prices and the industry's huge productive capacity in many lines have helped spur this cutback by providing adequate safeguards against short-supply positions, threat of price hikes. This could change, of course, as the economy recovers fully, forcing purchasing men to protect themselves with greater supply levels.

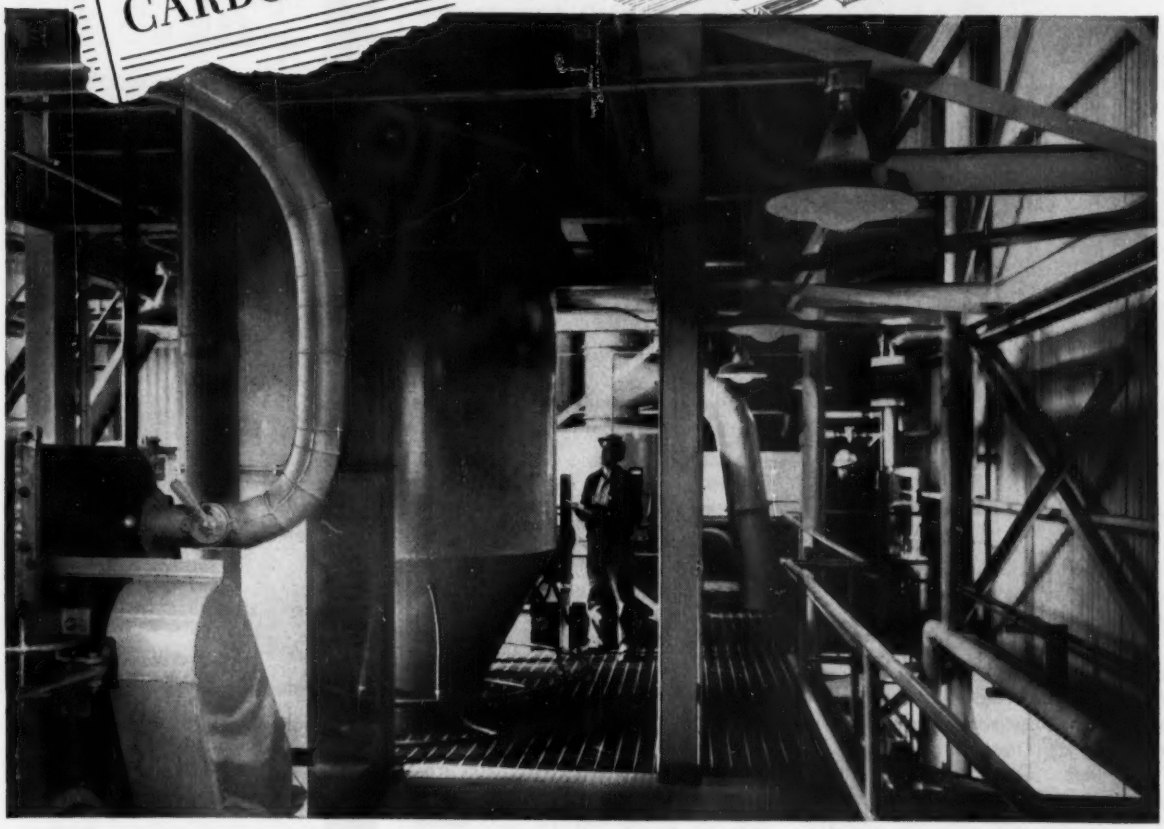
But finished goods inventories have continued to grow for several reasons: human inertia in cutting down production in face of decreased sales, confidence in the economy's recovery, intense competition. And, even now, with bulging stocks, many large CPI companies don't feel they are overstocked.

Excessive Cuts? Conversely, many firms have seriously hurt their current sales by failing to maintain sufficient finished product inventories to handle numerous large, rush orders. Several companies told CHEMICAL WEEK they've recently picked up unexpected business simply by having ready-to-go stocks.

Producers of mineral acids, some salts and resins are among those who

PITTSBURGH CHEMICAL MAKES CARBON NEWS!





New "Big Sandy" Activated Carbon Plant Goes Into Operation

Pittsburgh Chemical's new "Big Sandy" activated carbon plant near Ashland, Kentucky is now in production. This is important news to a constantly growing number of industrial users who depend upon these unique coal-derived materials for superior adsorption in a wide variety of purification, decolorization and refining processes.

Even more important, the completion of the multi-million dollar "Big Sandy" plant, coupled with our present Neville Island facilities, will provide dual plant service and result in these specific advantages:

Cost savings . . . efficient design and modern low cost techniques reduce carbon production costs . . . savings are passed on to you.

Assurance of Supply . . . two plants at separate locations assure your supply of Pittsburgh Activated Carbon.

Faster Service . . . two shipping points mean speedier more flexible service.

Modern Shipping Facilities . . . permit bulk and package shipments that significantly reduce your handling costs.

Have an adsorption problem? Pittsburgh Chemical is better able than ever to help you solve it! Call or write your nearest Pittsburgh Chemical office for complete information on Pittsburgh Activated Carbons.

2804

ACTIVATED CARBON DIVISION

PITTSBURGH CHEMICAL CO.

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How CPI Inventory Management Is Changing

Customer service	Special packaging, emergency shipments are more frequent. To compete, most firms have raised finished goods stocks to record levels, but some are losing business because of severe cutbacks.
Sales forecasts	Annual forecasts are still most widely used, with monthly and moving 12-month forecasts close behind. Nearly one-half the companies queried report using quarterly or five-year forecasts.
Management controls	To indicate inventory conditions, CPI management still depend largely on total dollar investment and inventory-sales ratios. Return on invested capital still is considered too unwieldy.
Data processing	Over half the companies queried use punched-card data-processing systems; more than one-quarter have begun using computers. But manual methods are still the workhorses.
Raw-material stocks	Blanket orders are on the upswing; there's more spot buying, but few firms plan major increases in raw-material stocks in coming months. Stocks are generally below year-ago levels.

Sources: Surveys by American Production and Inventory Control Society and Chemical Week.

feel that cutbacks have gone too far. Doubtless, marketers of other lines do too.

Buyers Are Tougher: Most CPI marketers and purchasing men believe their companies came through the current business slowdown in better shape than through previous ones.

Morever, most of them indicate that inventory management got closer attention this time, and few capitalized on the situation more than chemical buyers. They've stepped up spot buying, taken advantage of good price deals whenever possible.

Another practice that is growing rapidly is blanket ordering—in which the buyer specifies how much of a product he may need over a period of time, and settles price and credit terms at the outset. Then, the supplier, often a distributor, stocks the item and ships on specific request. Many of these shipments are smaller than customary, and an increasing number could be called "emergency shipments" — needed almost immediately to keep production going. Suppliers, naturally, resent this.

New Inventory Perspective: Many managers associated with inventory problems believe that partly because of the recent recession, top management is considerably more aware of the effect of inventories on corporate profits. In fact, some of them describe it as a wholly new perspective.

They note that some of the classic views toward inventories (that they're a necessary evil; that they exist solely for better production efficiency, or just to support sales activity) and arbitrary techniques for controlling them are fast giving way to much-more-scientific management methods. Along with more precise methods, they feel, some of the intracompany conflicts between purchasing, production and sales may be soothed. Management's inventory goals haven't changed; aim is still to maximize return on investment while minimizing costs in (1) meeting market requirements promptly, and (2) maintaining steady employment and production.

But companies differ widely in their estimates of how much inventory costs them. Some—particularly smaller ones—say the rule-of-thumb, that inventories represent about 18-25% of the cost of the goods stocked, is about right. Larger firms indicate that this figure seems high. At any rate, they agree that high product investment required is the most costly element in inventory expense—as well

Re expense item: Excess Baggage Charge - $22.

"It just didn't occur to me when I filled it out, but I can see why the item raised eyebrows in the Accounting Department," said one of our Materials Handling Supervisors. "So, prompted by their *more details* memo, I resubmitted the expense account in question with a notation as follows:

"For a one-day round-trip service call the amount indicated would appear excessive as far as personal articles are concerned. Actually my suitcase was full of steel fittings...intended for use in unloading a 10,000 gallon tank car of acetaldehyde. Subject tank car was shipped to customer for October 9 arrival. On October 10 customer telephoned that at start of unloading operation considerable leakage occurred in discharge connections. While all tank car unloading connections were carefully checked before shipment, we felt it advisable to provide on-the-spot assistance, especially since 15 psi. inert gas pressurized unloading of acetaldehyde was a new procedure for this particular customer. As it turned out the leakage was not caused by faulty fittings, but improper hook-up which was quickly remedied, allowing discharge to proceed routinely. It was then necessary to bring back the extra fittings, thus incurring a double-up excess baggage weight charge, which accounts for the unusually high expense item."

While this story indicates the eternal vigilance of our Accounting Department and their constant effort to control the cost of doing business, we think it serves to illustrate a more important point. That is, the cost of the trip itself was *not* questioned...because it came under the heading of *customer service.*

Eastman CHEMICAL PRODUCTS, INC., KINGSPORT, TENNESSEE, Subsidiary of Eastman Kodak Company

SALES OFFICES: Eastman Chemical Products, Inc., Kingsport, Tennessee; Atlanta; Boston; Buffalo; Chicago; Cincinnati; Cleveland; Detroit; Greensboro, North Carolina; Houston; Kansas City, Missouri; New York City; Philadelphia; St. Louis.
Western Sales Representative: Wilson & Geo. Meyer & Company, San Francisco; Los Angeles; Portland; Salt Lake City; Seattle.

as the one that offers best chances for cost reduction.

CHEMICAL WEEK's survey, along with one recently completed by the American Production and Inventory Control Society (APICS) (involving 30 CPI firms among more than 500 respondents) illustrates how CPI inventory management is changing.

Unified Management: Although inventory matters reach into many company departments, a growing number of firms are unifying inventory control under a single manager. Many companies have long managed inventories in a decentralized fashion, with policy being coordinated by a central committee.

But, increasingly, separate organizations without representatives from the traditional inventory-handling departments (production, purchasing, finance) are taking over this job. Five of the 30 chemical firms replying to the APICS survey indicated they had such inventory organizations.

Goodyear Tire and Rubber Co. (Akron, O.) (not a survey participant) credits its present healthy inventory position largely to its merchandise control system. In this, one manager is responsible for materials management all the way from raw materials purchase to finished goods delivery to customers.

General Aniline & Film Corp. (New York) recently launched such a unified inventory management setup, feels it offers one of the brightest hopes for improved coordination and more efficient materials management.

Better Methods: Other studies point up the steady progress of companies in converting to newer inventory-control methods that seem to promise virtually complete automation eventually.

Computers are now in use (or soon will be) by about 25% of the firms APICS queried. Principal jobs: keeping running totals of raw materials and finished goods stocks, handling the preparation and timing of production orders, maintaining totals of order backlogs.

Over half of APICS's respondents employ punched-card systems, while nearly one-fifth use control boards and a few use edge-notched card systems. But for most companies, manual systems are still the mainstays.

Some other inventory-control methods that are becoming more widespread:

- Pressing for 2-3 weeks advance notice when special packaging is needed.
- Minimizing finished goods stocks by channeling material into intermediate stages from which it can be converted into any of several products.
- Calling customers who haven't ordered recently during a particular production run from which they may logically want to order. (Goodyear has used this idea to precipitate orders and found that it works quite well.)

Improved Sales Forecasts: Many firms are trying to improve their sales forecasting, so that inventory managers have a clearer idea of what to plan for. Of course, there are numerous inherent difficulties—and error sources—in most forecasts.

Many companies are now increasing the number of moving forecasts they make, to eliminate error and doubt, while at the same time using more short-range forecasts.

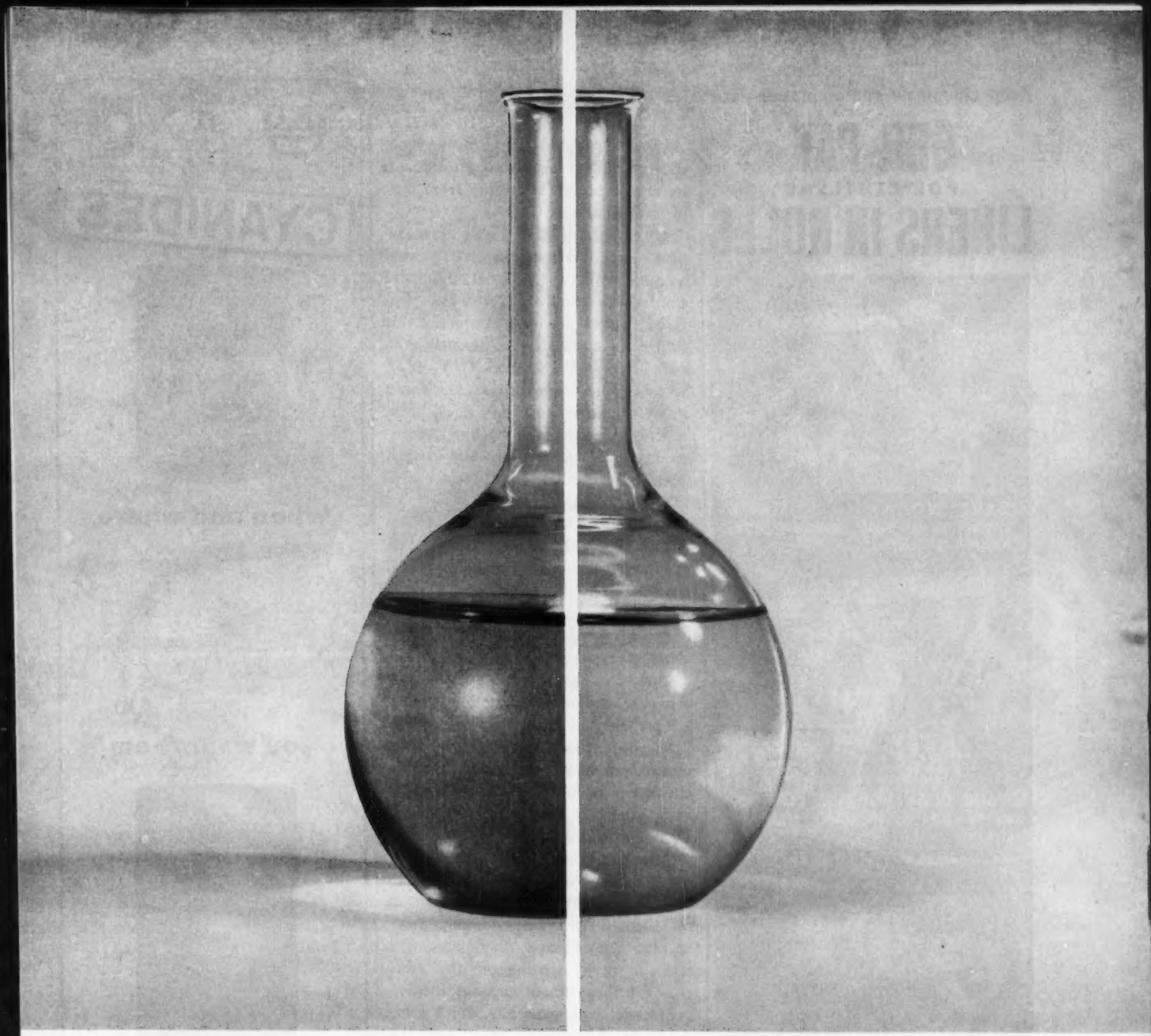
Two-thirds of the APICS survey respondents reported that they depend mainly on annual forecasts, while half of them use monthly or moving 12-month surveys. More than one-fourth of them use quarterly forecasts and an equal number predicted sales five years ahead.

Only one-sixth of those queried reported they now use their sales department's forecasts without adjustment or interpretation by the production planning group or others. Companies evidently prefer to temper their sales organization's enthusiasm with historical data, statistical measures and management estimates.

Better Calipers: CPI companies are working at streamlining their tools for measuring and controlling their inventories, and they use quite a variety of them.

Most commonly mentioned by the APICS survey were turnover rates (ratio of monthly inventory to annual sales), total dollar investment in inventories, and number of days' supplies on hand (used mostly for raw materials).

Return on invested capital, while used by many of the largest chemical manufacturers, is still not a widely used inventory measure. The occurrence of obsolete or surplus items is



Eliminate color in vinyl plasticizers with new Unitol CMT!

WHEN the esters of most conventional tall oil fatty acids are epoxidized, they develop a red color. Before they can be used in vinyl plasticizers, the color must be removed. This is usually done by washing the plasticizer or by distilling the epoxidized ester prior to use.

Either way, it's an impractical and costly procedure. For even though you thought you had a bargain in the price you paid for ordinary fatty acids, any savings you realized usually are washed out with the red color.

Now, with UNITOL CMT, this problem is eliminated. Through Union-Camp research, the agent which caused the red coloration has been identified and removed. As a result, the necessity, inconvenience, and expense of distillation and washing has been eliminated. You get better plasticizers with fewer processing headaches.

Samples of UNITOL CMT are available now for your evaluation. Write today for full information.

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checked closely by some firms, while others merely look for a minimum number of crises stemming from lack of raw materials.

One of the newest inventory measures, just developed in '60 by staff members of the National Industrial Conference Board, reportedly provides more accurate estimates of future inventory requirements than most traditional measures (*CW, Sept. 3, '60*). The NICB formula takes into account movements in sales, new orders, current order backlogs, commodity price expectations and interest rates to predict short-term (3-6 months) inventory needs.

One-fifth of those firms queried by APICS reported that they do not measure the effectiveness of inventory management at all.

Checking the Store: How often do chemical companies actually take a physical count of their inventories? Annual checks for audit seem to be the rule, although bimonthly checks are performed—particularly in smaller field warehouses. Most firms, of course, maintain informal running checks on inventory levels, use monthly or quarterly reports to prepare accounting records.

Although some companies say it's difficult to reconcile book versus actual stock totals, most firms queried by CHEMICAL WEEK do not. Several of them noted they solve this one simply by writing off any merchandise they cannot account for.

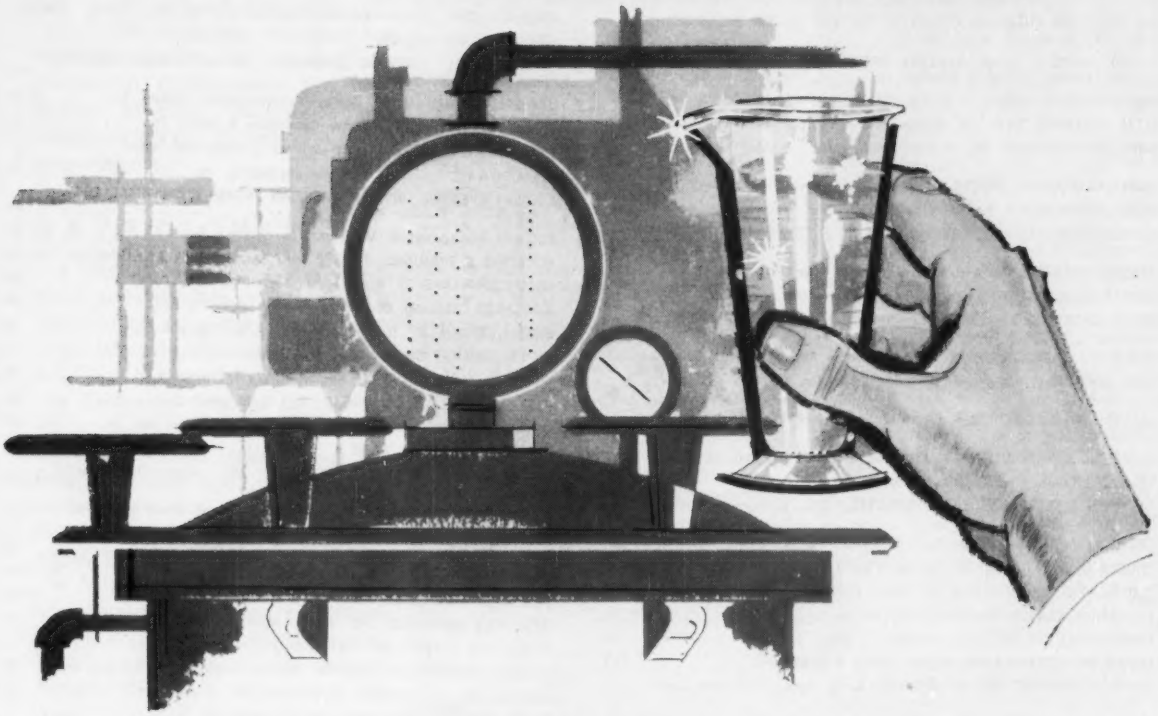
Storage costs, generally, don't compare with the product investment for most CPI companies, but heavy industrial chemical producers say storage is easily their toughest problem.

Prospects: At this point, no substantial inventory changes appear to be in the cards. Granted, finished goods stocks will rise to support the expected upturn in sales volumes later this year. The increase, however, is not generally expected to be large.

Raw materials stocks likely will not move upward very much in the months ahead, either, except where material is in short supply or in line for a price hike. Producers have learned to live with lower stock levels, so they are likely to continue to push the inventory burden back on their suppliers.

All told, CPI management doesn't look for inventory accumulation to accelerate or dampen the rate of re-

New Standards of Filtration Control



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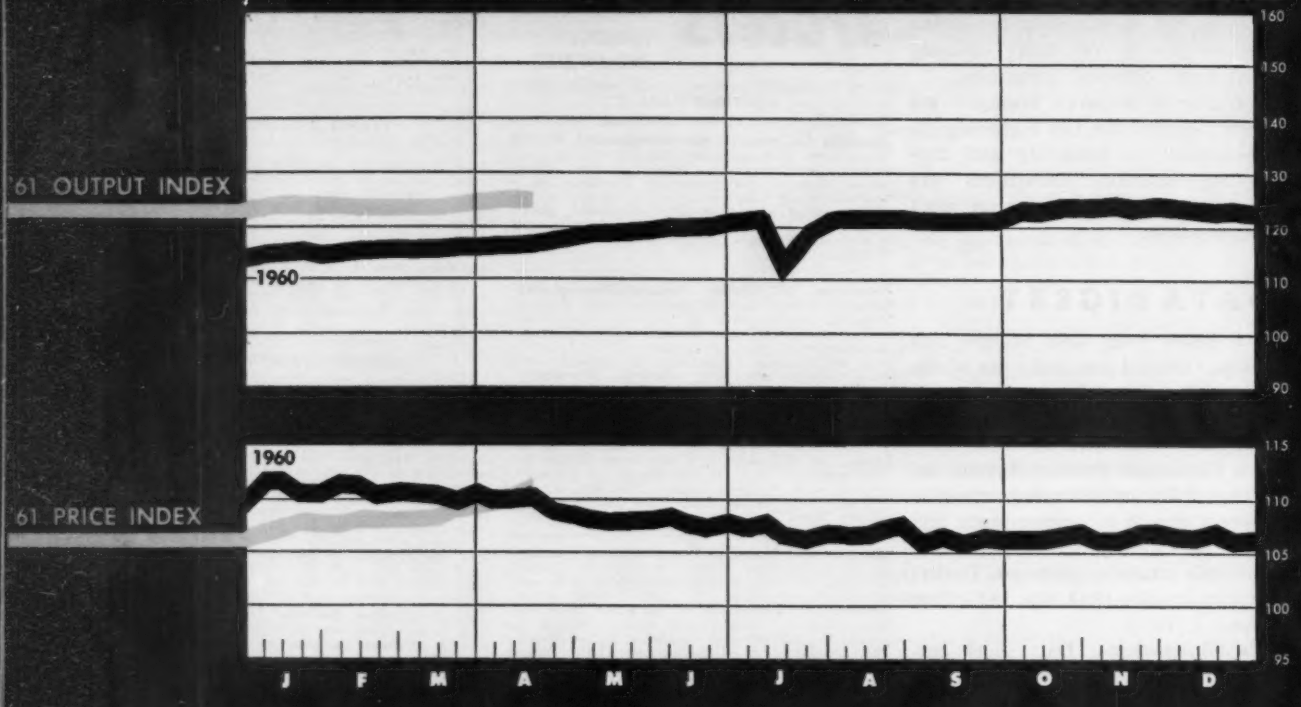
covery, just as inventory liquidation *per se* late in '60 didn't seriously hurt many chemical companies.

But most inventory managers are convinced that the CPI's growing sophistication in measuring and controlling inventory fluctuations will contribute greatly to long-term profit improvement.

DATA DIGEST

- **Resins Price List:** Bulletin lists prices, technical data and terms of sale for solid resins, solutions and emulsions. Pennsylvania Industrial Chemical Corp. (Clairton, Pa.).
- **Cottonseed Protein:** Bulletin describes ability of cottonseed protein to support growth of actinomycetes and fungi for industrial fermentations and antibiotic screening programs. Traders Protein Division (P.O. Box 1837, Fort Worth 1, Tex.).
- **Nitromethane:** Data sheet outlines storage and handling precautions for nitromethane, with information on toxicity, stability and fire hazard. Nitroparaffins Dept., Commercial Solvents Corp. (260 Madison Ave., New York 16).
- **Surfactants:** New, 28-page booklet describes properties and applications of surfactants used by the cosmetic and pharmaceutical industries. American Alcolac Corp. (1440 Fairfield Road., Baltimore, Md.).
- **Polyester Resins:** Two booklets describe characteristics, end-uses and "spray-up" techniques with Laminal (R) polyester resins. Plastics and Resins Division, American Cyanamid Co. (Wallingford, Conn.).
- **Lactose:** Technical bulletin (L-1) outlines properties, food and chemical uses, nutritional benefits and major derivatives of lactose. Western Condensing Co. (Appleton, Wis.).
- **Fungicides:** New publication (AP-96) describes characteristics of nonvolatile, chemically stable, and nonirritating fungicidal and bactericidal agents. Uses: processing and preserving textiles, organic liquids and pastes, pulp and paper, plastics and electrical insulation applications, etc. Antara Chemicals Division, General Aniline & Film Corp. (435 Hudson St., New York 14).
- **Product Data:** Catalog lists Benzol Products Co.'s (237 South St., Newark 5, N.J.) line of chemicals, including specifications.

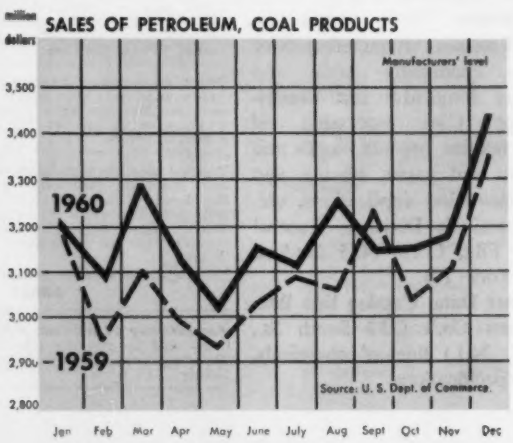
BUSINESS BENCHMARKS



WEEKLY BUSINESS INDICATORS	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1957=100)	125.9	125.6	119.4
Chemical Week wholesale price index (1947=100)	112.3	110.0	110.8
Stock price index (12 firms, Standard & Poor's)	51.16	51.24	53.31
Steel ingot output (thousand tons)	1,632	1,611	2,527
Electric power (million kilowatt-hours)	14,163	14,549	13,900
Crude oil and condensate (daily av., thousand bbls.)	7,351	7,366	7,151

TRADE INDICATORS (billion dollars)	MANUFACTURERS' SALES			MANUFACTURERS' INVENTORIES		
	Latest Month	Preceding Month	Year Ago	Latest Month	Preceding Month	Year Ago
All manufacturing	28.59	29.14	31.11	53.53	53.64	53.31
Chemicals and allied products	2.24	2.26	2.26	4.16	4.16	4.03
Petroleum and coal products	3.20	3.22	3.08	3.28	3.28	3.41
Paper and allied products	1.08	1.06	1.01	1.62	1.63	1.53
Textile products	1.10	1.14	1.26	2.72	2.67	2.58

CHEMICAL CUSTOMERS CLOSE-UP



The secret ingredient in this computer's spaghetti is petrochemicals!

It's a specialty of the house—making petrochemicals that help create the new materials that step up the efficiency of the many products we rely on every day. Here's one of them—part of a data processing computer. Protecting the intricate wiring network is color coded spaghetti—the tough polyvinyl chloride insulation that refuses to crack, melt or peel even under extreme temperature conditions.

In electronics, you'll find petrochemicals helping make TV sets slimmer, radios smaller, TV pictures clearer. Even the style and color of your modern telephone is fashioned in large measure by petrochemicals. If your product plans call for the use of basic petrochemicals, see how Gulf can provide you with an unbroken stream of supply and uniformity shipment after shipment. Write or call our Sales Office, 360 Lexington Ave., N. Y. 17, N. Y.

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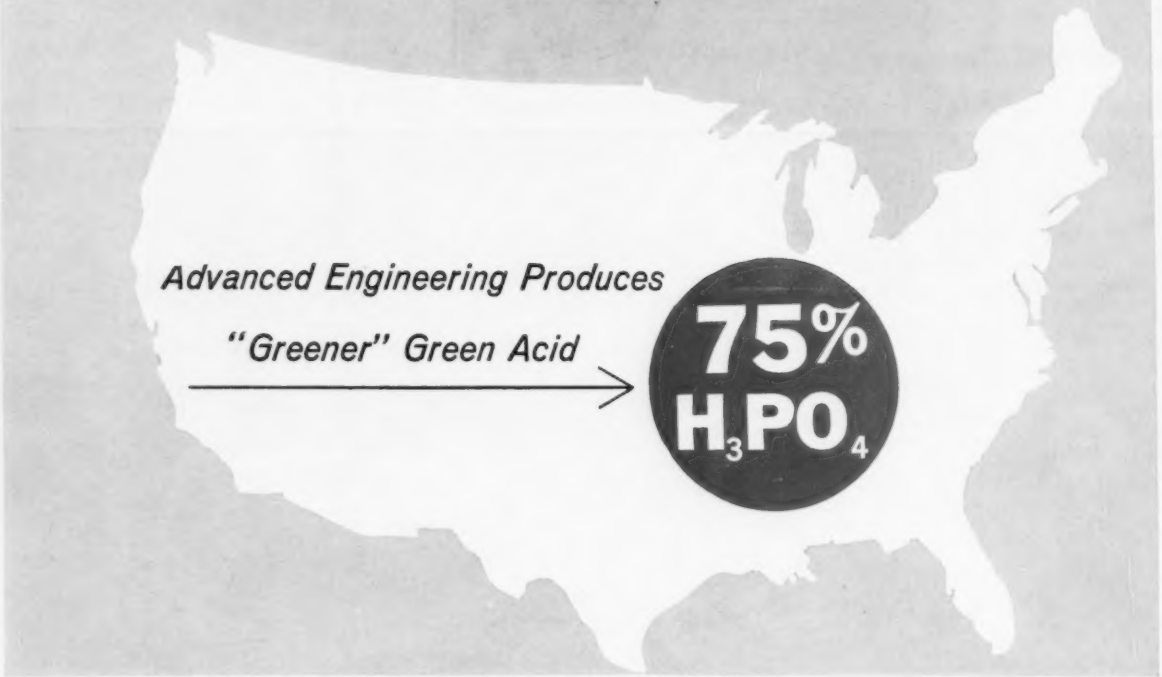
NOW ON STREAM!

General Chemical's New E. St. Louis Wet Process Phosphoric Acid Plant



The green acid from General Chemical's latest design wet process phosphoric acid plant is *really* green! It runs 75% H_3PO_4 consistently—or 54.3% P_2O_5. It is cleaner, with lower solids content, and therefore easier for you to use and handle.

For information on this new greener phosphoric acid—and how it can bring you savings in your own operations—call your nearest General Chemical office.

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